ergonomic solutions

The ergonomics of tablet use in business applications

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TECHNOLOGY MOUNTING SOLUTIONS

Ergonomics of tablets

Tablet computers with touchscreen displays are becoming increasingly common in both workplaces and the public domain, such as for customer use in retail stores and airports. This market is expected to continue its rapid growth so understanding the ergonomics of tablet use is an important consideration for ergonomists, employers and facilities managers.

Postural guidelines and best use practices are well established for traditional computing devices; desktop and laptop computers. Musculoskeletal issues are addressed and the risks to user health minimised by legislation Regulations and Guidance documents. Devices with new touch technology are inadequately covered by established guidelines and legislation and so can present health risks and accessibility challenges for users.

Postural risks

Traditional computing technology comprises separate input devices and display, in touchscreen and tablet computers the input and display are integrated into one unit. This means that there is a reduction in space between the input area and display; and the unit must be positioned for both viewing and frequent touch interaction. Posturally the interaction between people and tablets/touchscreen computers is very different to that with traditional computers. Having separate input devices; mouse, keyboard and display allows for a more upright posture of the head and neck. The postures and biomechanics associated with tablet technology is closer to that experienced when working with pen and paper.

Use of tablet technology has been associated with a number of musculoskeletal stressors that constitute a risk to health:

- Repetitive, awkward finger movements.
- Static, awkward postures of the neck and shoulders to read smaller, poorly placed screens.
- Awkward neck, shoulder and wrist postures during long use.
- Excessive gripping of the devices.

Head/neck

Research shows that the use of tablet computers is associated with a high degree of flexion in the head and neck; 15-25° beyond a neutral, relaxed posture. The muscles of the head and neck must work to maintain a flexed posture, this means users experience a greater postural load when using tablet devices than when using desktop and laptop computers. This increase will quickly lead to fatigue and discomfort, and over time, injury.

Users' posture is affected by the location of the device; the height and distance from the body. Research results suggest that head and neck posture can be improved by accommodating optimal viewing angles (head inclined slightly forward), by elevating the device and avoiding lap-level locations.

Hands/arms

Holding a tablet for long periods can lead to musculoskeletal discomfort and injury of the hands and wrists. The main problem will arise due to how these devices are held. Usually the non-dominant hand must hold the device, while operator uses the dominant hand to complete precise finger movements to touch the screen. Most tablets are generally very light but holding even a low weight item in a fixed position for long periods of time without support can cause discomfort. Additionally, the other fingers of the dominant hand must be held out of the way so that they do not accidentally touch the screen.

Any person attempting to use a tablet who suffers with grip problems or upper limb weakness will find this task more difficult. Providing a mounting or hand strap will assist both disabled and abled-bodied users.

The location of a tablet during use

To best position the device for each user it is necessary to take into consideration which tasks are being undertaken – primarily viewing, inputting or a mixture of both.

Tablet computers can be used to consume content; reading text or viewing a video or images, and they can be used to create content; inputting text or other media. Consuming and creating, each place different demands on the user and may require different placement configurations depending on the duration, frequency, and importance (pace of work) of the task.

If the device is used primarily to consume media such as viewing and reading web pages, then the position must be optimized for viewing. This means:

- Place the device higher than the lap
- Tilt the screen toward the eyes
- Ensure the device is at an appropriate viewing distance to avoid forward bending.
- If the device must be hand-held, consider an armrest to prevent arm and shoulder fatigue.

If the device is primarily being used to create or input content, the positioning must be balanced to accommodate the dual interactions; viewing and the hand/wrist/arm for inputting.

- Placing the device flat on the desk is great for the hand/arm but will result in high degrees of neck flexion.
- Tilting the device towards the user can help reach a balance between the visual and inputting actions. However, placing the device up on a tight angle will result in wrist extension, flexion and strain. In this instance it is advisable to treat the tablet more as a writing pad, and consider the benefits of positioning the device on a gentle upwards slope – the usual position of a traditional writing desk.
- During intensive inputting a separate keyboard should always be used.

Best work practice: to reduce the risk of fatigue, discomfort and injury the following pointers will help an operator maintain a neutral and comfortable working posture.

- Reduce the duration and frequency of use. Take frequent microbreaks from intensive tablet use.
- Alternate fingers/hands when using buttons/touchscreens.
- Reduce the number of required keystrokes with text shortcuts (search “text shortcuts” on the web browser), or where feasible, use speech-recognition applications.
- Maintain neutral wrist posture and alternate hands when holding devices. Consider using a case with a hand strap or a flexible mounting to reduce gripping.
- Focus on neck posture – avoid excessive looking down when using a tablet.
  The best location for use is just below the field of vision. Ensure the tablet can be placed in a location suited to each individual’s requirements and the task particulars.
- Keep the upper body posture neutral and well supported. The neck should be straight, shoulders relaxed, and the arms positioned near the torso.
- Avoid twisted and asymmetric postures – place the tablet directly in front of the body.

Accessibility challenges

When tablets are placed in the public domain it is critical that all intended users have access to the same information and can accomplish the same tasks using whatever input and output methods are required by the individual.

Many tablets have inbuilt accessibility features which can be utilised to assist users who may otherwise have difficulty using such technologies:

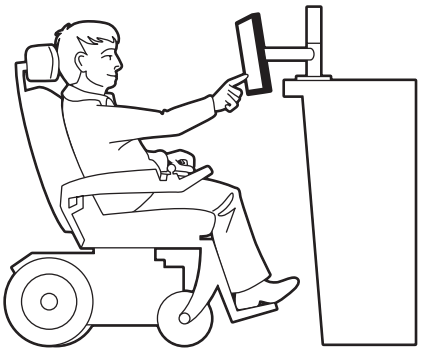
- Magnification
- Screen reader apps
- Ability to set visual displays resolution, font size/type, colour and tonal contrast settings

In other cases a separate navigator device can be used by users to overcome disabilities.

For users with fine motor skill impairments, touch screens are more accessible than keyboards or mice when it comes to inputting information. The removal of the abstract inputting devices; keyboards, mice and even track pads makes the resulting interaction more immediate and clear. Tablets offer great flexibility in terms of positioning. Providing a tablet can itself be moved or is fitted into a mounting that allows tilt and location adjustment, tablets can be accessed by all intended users – able-bodied and disabled.

Consideration must be given to the following to ensure that a tablet intended for public use is indeed accessible by all people:

- Adequate space to allow wheelchair users to get close to the tablet. This includes the provision of a foot/knee gap under the furniture.
- Adjustability – ensure the tablet can be moved enough so that it can be positioned so that all users can reach and see the screen, and position the device to avoid glare and reflection.
- Consider using a flexible mounting or hand-strap to reduce the need to grip the tablet during use.



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