



Cornell University Ergonomics Web

What follows is part of such an ergonomics program, in the form of guidelines that have been developed for the parents of school children, from the needs identified by a project with Blackwell Elementary School in Redmond, Washington. The guidelines have been included in the "Get Techfit" program developed by [Diane Tien](#) and her class at this school.

1. Risks Of Keyboarding

People are always being told all about how typing for long periods of time is bad for you, but have you ever wondered what really happens and if there is a real cause for alarm? Well, unfortunately, there is!

Poor typing posture can cause pain and other symptoms in your:

- Back
- Neck and shoulders
- Hands and wrists
- Eyes

Back Pain

The lifetime prevalence of low back pain has been estimated at nearly 70% for industrialized countries (Andersson, 1991), and much of this is related to poor posture while sitting. Back pain is certainly not limited to adults. In fact, it has been reported that approximately 23% of elementary school children complain of backache and that this percentage rises to about 33% among the secondary school population (Mierau, 1984, cited in Marschall, Harrington, and Steele, 1995). Two European studies even found that as many as 60% of schoolchildren experience back problems by the ages of 15 or 16 (Balague, 1988 and Davoine, 1991, both cited in Mandal, 1997). A study of 500 US teenagers found that 56% of the males and 30% of the females suffered from degeneration of the spine as supported by X-ray evidence (Fish, 1984, cited in Knight and Noyes, 1999).

Hand/Wrist Problems

- These include Musculoskeletal Disorders (MSDs), also known as CTDs (Cumulative Trauma Disorders), RSIs (Repetitive Stress Injuries), OODs (Occupational Overuse Disorders), etc.
- Since the late 1980s, the incidence of MSDs has skyrocketed, especially among those performing computer intensive work. The number of repeated trauma cases

- increased steadily from 23,800 in 1972 to 332,000 in 1994—a 14-fold increase (Bureau of Labor Statistics, 1995).
- Although there are few statistics on children and MSDs, with so many children starting to use computers at such an early age, there is no telling whether this may accelerate the incidence of MSDs.
 - Since the average American child is currently spending one to three hours daily in front of a computer (Roper Starch, 1999), there is a great potential for injury.
 - In their milder forms, MSDs may involve injury to the tendons and their sheaths within the hand and wrist area, which may cause:
 - Discomfort
 - Tenderness to touch
 - Inflammation
 - Weakening of the tendons
 - The more serious MSDs may lead to the following symptoms in the hands, fingers, and arms:
 - Pain
 - Numbness
 - Tingling
 - Loss of sensation

Carpal Tunnel Syndrome (CTS)

- One of the most serious and best known MSDs, although because it is a nerve compression injury sometimes it is separated from other MSDs that typically involve tendons and tendon sheaths.
- It results when the median nerve does not "work" properly. Usually, this is thought to occur because there is too much pressure on the nerve as it runs into the wrist through an opening called the carpal tunnel.
- Eventually, the pressure inside the tunnel reaches a point when the nerve can no longer function normally. Pain and numbness in the hand begin and progress if the cause is not eliminated.
- Repeated forceful movements made by the hands while in [deviated postures](#) (flexion, extension, ulnar radiation, and radial radiation) are known to dramatically increase the risks of developing this syndrome.
- Ulnar and radial deviation contribute to MSDs, but it is flexion and, particularly, extension that are the real culprits.
- Remember that when the wrist is in a neutral position, the carpal tunnel is as big as it can be—so the nerve has as much room as possible and injury can be prevented.

2. Preventing Injury When it comes to preventing injury, adults and children need to primarily:

- Keep their body and wrist posture in neutral positions while sitting and keyboarding.

- Have an appropriate workstation configuration.
- Take breaks at appropriate intervals.

Neutral Keyboarding Posture

- Upper and lower back well supported by chair
- Chair height set so that the chair seat does not compress the back of the knees
- Feet firmly planted on a surface for support (floor or footrest)
- Head balanced on neck (not tilted back or too far forward)
- Upper arms close to body and relaxed (not abducted to the side or flexed forward)
- Sitting so that the:
 - Angle formed by the shoulders, hips, and knees is >90 degrees
 - Angle formed by the shoulder, elbow, and wrist is >90 degrees
 - Angle formed by the hips, knees, and feet is >90 degrees
- Wrists at a neutral position, level with forearm (<15 degrees deviation)
- Chair armrests not directly compressing any part of the forearms or elbows
- Moving a mouse with your forearm and not just your wrist (will reduce hand deviation) View the [ideal typing posture](#)
View 2 less-than-ideal typing postures: [desktop keyboard](#), [conventional keyboard tray](#)

Ideal Computer Workstation

Many people spend thousands and thousands of dollars on their computers, software, and games and then completely disregard the workstation where they sit day in and day out. But that would be like buying a Ferrari and then buying the cheapest tires possible! It just won't work in the long run—and it's the person who's going to end up hurting, literally.

1. Furniture and Equipment

- Stable work surface. One that is adjustable in height may be good to have when adults and very young children are sharing the same workstation.
- Comfortable, ergonomic, adjustable chair with at least chair height and back support adjustment mechanisms. If the back tension of the chair does not adjust, make sure that the lower back is firmly supported. Armrests that pivot and are height and width adjustable are also a good idea. Remember that while most adjustable features are not absolutely essential, they do assure that many people of different sizes will feel comfortable in the chair.
- [Height-adjustable, negative slope keyboard tray](#) is best for keeping the elbows at a >90 degrees and for allowing the wrists to remain in a neutral position.
- Note: [Desktop keyboards](#) and those placed on [conventional, articulating keyboard trays](#) (those on a positive slope) do not fully allow the elbows and wrists to remain in neutral posture and actually encourage wrist extension.

- Height-adjustable, gliding mouse platform that allows the mouse to be positioned close to the side of the body, above the keyboard tray (so that the arm does not have to reach to the side).
- It does not matter exactly what type of keyboard and pointing device you use as long as whatever you use feels comfortable, fits your hands, and allows you to work in a neutral hand and body posture.

2. Normal Work Area

- The normal work area corresponds to the space and objects that can be reached by a person while sitting in front of a computer, without having to twist the body or reach far. Make sure that everything you need is within this area, including books, documents, tools, a telephone, etc.
- Be sure that the desk has a surface large enough to support all of your materials, even the ones that you are not currently using.
- If typing from a book or document, make sure that it is placed in a document holder that is placed near the screen, in order to avoid head twisting.
- The body should be centered on the alphanumeric part of the keyboard. Most keyboards are asymmetrical in design (the alphanumeric keyboard is to the left and a numeric keypad to the right). If the outer edges of the keyboard are used as landmarks for centering the keyboard and monitor, the user's hands will be deviated because the alphanumeric keys will be to the left of the user's midline.

3. Computer Monitor Position

- Monitor that is height and angle adjustable works best.
- Monitor should be placed directly in front of the user and facing the user, not angled to the left or right (to discourage neck twisting).
- Your eyes should be in line with a point on the screen that is 2 to 3 inches below the top of the monitor. If the monitor is above or below this height, your neck will be raised or lowered and the result will be neck pain.
- Monitor should be at a comfortable distance for viewing, which is usually around an arm's length (sit back, raise your arm, and your fingers should touch the screen)
- If text on the screen is too small, increase the font size—do not move monitor closer.
- Users with bifocal glasses should tilt their monitors slightly backwards.

4. Lighting

- It should not be too bright or too dark. Always use light even though a computer screen is self-illuminating—there should not be a large contrast between the screen and the area surrounding it.
- Indirect lighting (that which illuminates the walls and ceilings), in combination with a task light, works best.

- If you do use a task light, position it as far away as possible—make sure that you cannot see the light source when you look at the screen.
- There should be no glare falling on the screen. If there is, reposition the workstation with regard to the light sources (natural or artificial). Be careful not to just move the monitor, resulting in a poor viewing angle. If repositioning alone does not work, use a good quality glass anti-glare screen. If left uncorrected, glare will cause discomfort, eyestrain, and headaches.
- Avoid very glossy work surfaces and furnishings, such as mirrors and shiny metal, which will contribute to glare.

5. Noise and Ventilation

- Work in an environment with a level of noise that is comfortable for you. Working in an uncomfortably loud environment stresses the body and, as a result, the muscles tense up. This tension accelerates injury.
- If using headphones, make sure they are at a comfortable noise level and that they fit properly.
- Workstation should be located in a well ventilated area, with adequate heating and cooling in order to minimize discomfort.

3. Taking Breaks Is Important! The risk of problems associated with computer use depends more on the amount of time that one spends keyboarding without taking a break in one single session than on the total number of keyboarding sessions. You can regulate your own computer usage and that of your child(ren) in the following ways. Just remember that breaks and exercises need to be combined with good workstation set-up and/or posture for them to be of most help!

- **Eye Breaks:** Looking at a computer screen for a while causes some changes in how the eyes work, causes you to blink less often, and exposes more of the eye surface to the air. Every 15 minutes you should briefly look away from the screen for a minute or two to a more distant scene, preferably something more than 20 feet away. This lets the muscles inside the eye relax. Also, blink your eyes rapidly for a few seconds. This refreshes the tear film and clears dust from the eye surface.
- **Micro-breaks:** Most typing is done in bursts rather than continuously. Between these bursts of activity you should rest your hands in a relaxed, flat, straight posture.
- **Rest Breaks:** Every 30 to 60 minutes you should take a brief rest break. During this break stand up, move around, and do something else. Go get a drink of water, soda, tea, coffee, or whatever. This allows you to rest and exercise different muscles and you'll feel less tired.
- **Ergonomic Software:** Working at a computer can be hypnotic, and often you don't realize how long you've been working and how much you've been typing and mousing. Look for software that will run in the background and monitor how much you've been using the computer. It will prompt you to take a rest break at

appropriate intervals, and it will suggest simple exercises. You can purchase this software or you can download simple versions that get the job done just as well. Check out [ErgoPal](#).

- **Exercise Breaks:** There are many quick stretching and gentle exercises that you can do to help relieve muscle fatigue. These should be done every 1-2 hours, depending on your needs.

4. Workstation Exercises (to be done at least once an hour)

1. **Deep Breathing:** Breathe in slowly through the nose. Hold for 2 seconds, then exhale through the mouth. Repeat several times.
2. **Head and Neck:** Turn head slowly from one side to the other, holding each turn for 3 seconds. Repeat several times. [View photos](#)
3. **Back:** Start with the arms bent, hands near chest area, and push elbows back. Hold for 5 seconds, then relax. Repeat several times. You can also raise arms in the same fashion, this time close to the shoulders, to work out the upper back. [View photos](#)
4. **Shoulders:** Roll shoulders slowly in a circular fashion, while trying to make the circle as big as possible. Take about 5 seconds to complete one circle. Repeat several times. [View photos](#)
5. **Wrists:** Hold your hands out in front of you. Slowly raise and lower your hands to stretch the muscles in the forearm. Repeat several times. [View photos](#)
6. **Fingers and Hands:** Make a tight fist. Hold for a second. Then spread your fingers apart as far as you can. Hold for 5 seconds, then relax. Repeat several times. [View photos](#)
7. **Tendon Gliding Exercises:** These relieve tension in the tendons. Do each of the following movements slowly, but do not force any of the positions. Go as far as you comfortably can.
 - a) Starting Position: Raise your arm, with the hand extended (you can also rest the elbow on a table and extend the hand).
 - b) Roof: Bend your fingers down to a right angle. Return to starting position.
 - c) Straight Fist: Touch your fingertips to the base of your palm, keeping the thumb straight. Return to starting position.
 - d) Hook Fist: Gently make a hook. Return to the starting position.
 - e) Full Fist: Make a fist. Return to the starting position.[View photos](#)

In addition to these exercises, encourage your children to take short breaks (microbreaks) and to do some gentle stretching or stand up and move around during these brief pauses.

5. So You Don't Have the Ideal Workstation, Huh? Although you realize that proper equipment is important in minimizing your risk for injury, you've decided that you're absolutely not going to go out and buy all the components for an ideal

workstation. But there are still many inexpensive things you can do to improve your current workstation.

Some of the following are also some things you can do to improve existing workstations that are not your own (such as in a library).

- Prioritize in terms of what workstation features need to function best for your own needs and those of others who will be using the workstation. For example, if you know that your computer will primarily be used for word processing, make sure that you have a good keyboard setup. If it will be used primarily for web surfing, make sure that you have a good mouse/pointing device configuration.
- Also, prioritize in terms of your present physical condition. For example, if your right wrist tends to throb after 2 hours of inputting data into a spreadsheet, then try to obtain the best keyboard/mouse setup as soon as possible.
- If you use a desktop keyboard or one that is placed on a conventional, articulating tray, position the keyboard/tray at the most negative slope possible. You can tilt the keyboard tray away from you or place a book/wrist rest that is not too thick under the bottom area of the desktop keyboard in order to lift it.
- In the case of a desktop keyboard, you can also use a broad, flat wrist rest as a forearm support. The wrist rest should be approximately the same thickness as the bottom of your keyboard. Place the wrist rest midway between your wrists and elbow, but make sure that you are not compressing the area.
- If you don't have a mouse tray, at least make sure that the mouse is close to the side of your body, so that that your upper arm can remain relaxed and your posture can remain as neutral as possible.
- Wrist rests should generally not be used as actual resting places for your wrists. This is because wrist rests, especially the very soft, cushioned kind, actually contour to the wrists and encourage wrist twisting movements.
- Never use the "legs" that many keyboards have attached to the upper part of their bottom surface. Doing so would place the keyboard at a positive slope, which should be avoided.
- If you don't have an adjustable chair, you can still try to accommodate people of various sizes by using a back and/or seat cushion. You can also use a footrest (or a makeshift footrest, such as a pile of books or a box) for a child or a person of small stature. Just make sure that the feet are supported and the area behind the knees is not compressed.

6. Laptops And Their Inherent "Un-Ergonomic Design"

- Although laptops are certainly a great invention, there is no way that they will be ergonomic (in their present design) without a little help from you.
- It usually turns out that when the screen is at a comfortable height and distance, the keyboard isn't and vice versa. The best way to avoid discomfort here is to place the keyboard at a comfortable distance and enlarge the font, which you can always reduce later.

- If you use your laptop for more than one hour at a time, consider obtaining an external keyboard and/or monitor.
- The fact that a pointing device on a laptop is almost always located in the middle may not allow you to keep your arm at a neutral position while using it. Consider purchasing a mouse or any other external pointing device.
- As in the case of a desktop keyboard, you may use a wrist rest to intermittently support your hands in between bursts of typing on the laptop keyboard.
- Avoid using your laptop on a high surface. This will cause you to abduct your shoulders and lead to shoulder and back pain.

7. Ergonomic Gizmos: Are They Worth It?

These days just about everything is labeled as being "ergonomically designed" and much of the time this isn't true. Unfortunately, right now there is relatively no regulation of the term "ergonomic." Some so-called "ergonomic" products can even make things worse!

If you're thinking about buying an "ergonomic" product ask yourself the following 4 questions:

1. Does the product design and the manufacturer's claims make sense?
2. What research evidence can the manufacturer provide to support their claims? Be suspicious of products that haven't been studied by researchers.
3. Does it feel comfortable to use the product for a long period? Some ergonomic products may feel strange or slightly uncomfortable at first because they often produce a change in your posture that's beneficial in the long-term. Think of some products as being like new shoes that initially may feel strange but then feel comfortable after being used for a while. If a product continues to feel uncomfortable after a reasonable trial period (say at least a week), then stop using it.
4. What do ergonomics experts say about the product? If they don't recommend it, don't use it.

8. The Real Truth About The Most Popular Ergonomic Products

- **Ergonomic chairs:** As long as the chair has at least height and back adjustment features, it will be worth your while. These chairs can range in price from a hundred dollars or less to more than a thousand dollars, and generally the more expensive ones have more adjustment features and better construction. The greater a chair's adjustment capabilities, the greater the number of people that will be able to sit on it comfortably.
- **Armrests:** The best armrests will allow you to rest the area of your forearm that lies halfway between your wrist and elbow, without compressing any part of the arm. Look for those with at least height and width adjustment features. Research studies have shown that armrests provide many benefits, such as:

- Reduced postural strain to the upper body
- Reduced muscle loads in the upper arms, shoulders, and neck
- Reduced loads on the spine (by redistributing the weight of your upper body)
- Reduced forearm exhaustion while typing (when your forearm gets tired, you tend to increase wrist extension)
- Reduced key forces while typing (the amount of force with which you hit the keys plays a role in MSD development)
- **Keyboards:** Most ergonomic keyboards on the market today are split keyboards (those where the alphanumeric keys are split at an angle). These keyboards mainly address the problem of wrist ulnar deviation (side-to-side). However, wrist extension and flexion (vertical movement) are more important when preventing injury. There is no consistent research that shows that split keyboards offer any postural benefits-, and for most people a regular keyboard design works just fine if it's placed in the proper neutral position. Some people find split keyboards to be more comfortable than traditional keyboards, so if you use one, make sure that it is not causing your shoulders to abduct (raised higher than is comfortable).
- **Keyboard Trays:** Height-adjustable, negative slope keyboard trays (those that height adjust down to your lap and allow you to tilt them away from your body) function best because they allow the body and hands to maintain the most neutral working position (see section on Neutral Keyboarding Posture). In order to be in the proper position, you should almost feel as if your keyboard is placed on your lap.
- **Pointing Devices:** There is no conclusive research that says that one type of pointing device (mouse, trackball, stylus, touch pad, joystick, etc.) is better for you than another. Just make sure that when you use whichever one you choose, you are using it in a neutral position (arm relaxed, close to your body). A pointing device should also fit the hand of its user. Don't use a very large mouse if you have very small hands. Young children often prefer trackballs because the traditional mouse design is sometimes too big for their small hands.
- **Mice:** The mouse is the most popular type of pointing device and there are many types of "ergonomic" mice out there. Before you purchase a mouse, place your hand over it. If it causes your wrist to extend up too much, then it's not really "ergonomic." One recent study showed that one particular mouse design, which is flatter and broader than a traditional mouse, can reduce side-to-side wrist deviation.
- **Wrist rests:** Research studies haven't demonstrated any substantial benefits for wrist rests. Some people may actually experience increased pressure in the wrist area just from using one. If you do choose to use a wrist rest, a broad, flat surface design works best. Many keyboards come with an attached or built-in plastic wrist rest, which works well if it is broad and flat. Avoid soft and squishy wrist rests (gel-filled) because these will contour to your wrist and encourage wrist twisting movements—your hands should be able to glide over the surface of a wrist rest during typing. Using a wrist rest as forearm support can be comfortable and effective.

- **Glare Screens:** Glare screens can only reduce glare—a lot of people think that they can reduce or eliminate magnetic fields. This is simply not true, no matter what the packaging says. Any jargon on the packaging about “fields” usually refers to static electricity. Usually it is the higher quality glare screens that are worth getting. The lesser quality ones may reduce glare but may also accumulate a lot of dust, thereby obscuring the image. And remember that you may not even need a glare screen if you position your monitor in a way that does not encourage glare (refer to Lighting within Ideal Computer Workstation section).
- **Support Braces/Gloves:** There is no consistent research evidence that wearing wrist supports during computer use actually helps reduce the risk of injury. If you do like wearing a wrist support, make sure that it keeps your hand flat and straight, not bent upwards. There is some evidence that wearing wrist supports at night in bed can help relieve symptoms for those with Carpal Tunnel Syndrome.

9. Children’s Special Concerns

Although children have the same needs of adults when it comes to keyboarding, they also have some unique needs:

- A child, especially a very young one, may not be very aware of the position of his/her extremities in space (notice that occasionally young children draw distorted pictures of people). That is, it is very unlikely that a child will keep track of whether his/her wrists are positioned at less than 15° deviation. Therefore, it is especially important for the adult to notice and try to correct the child’s posture.
- Children may respond more to images than to writing when it comes to learning about the ideal workstation posture. Try showing them “before” and “after” pictures of workstations, as in the [Ergonomic Redesign of Workstations section](#). Maybe post one of these “before” and “after” shots by your child’s workstation.
- Children, especially the younger ones, have smaller hands than adults. A conventional keyboard may be too large for him/her. There is computer hardware available on the market today that is especially designed for children’s small hands. For example, look for [Little Fingers keyboards](#) at or search on the web for similar types of products.
- Sometimes children like to use trackballs instead of mice because their small hands find them easier to handle. A small mouse may be just as good.
- Children may find it more difficult than adults to know when to take breaks from typing or surfing the web. Thus, monitoring your child would be helpful, and they may respond well to monitoring software such as [ErgoPal and ErgoFun](#).
- Being able to adjust chairs, monitors, desks, etc., is very important for children to know how to do in order to be comfortable. Be sure that they understand and are physically strong enough to do so (some mechanisms are even difficult for adults).
- Adjustability is absolutely essential when a family shares a computer workstation.

10. Ergonomic Redesign Of Workstations

These before and after photos will help you to distinguish between good and poor workstation design.

- Average height 6th grader typing: Before and After [View photos](#)
- Average height 8th grader typing: Before and After [View photos](#)
- Tall 8th grader typing: Before and After [View photos](#)
- Average height 8th grader using a mouse: Before and After [View photos](#)

11. Websites For More Information Regarding Workstations

Products:

www.proformix.com

www.humanscale.com

www.3m.com

www.flexrest.com

www.magnitude.com

www.steelcase.com

www.datadesktech.com

Finally, be aware that some “ergonomic” sites that reference specific products might just be getting paid to advertise these products. Educational sites try to be unbiased.

12. Heavy Backpacks: To Carry or Not To Carry

There is growing concern these days that children are carrying way too much weight on their backs. It is not made easy by the fact that textbooks are getting heavier and that some schools are even taking away lockers, forcing children to carry all their daily belongings in their backpacks. Some schools also provide children with personal laptops, which might be great for the sake of technology and education, but also add a minimum of five pounds to the students' already heavy loads.

- More children than ever are currently paying visits to chiropractors, pediatricians, physical therapists, and other medical professionals. They are citing muscle aches, fatigue, numbness, and pain in the shoulders, neck, and back as complaints (*Washington Post*, September 14, 1999).
- Although many physicians claim that there is no research to suggest that carrying a heavy backpack is going to curve the spine (scoliosis), many admit that there is no telling what problems may occur 20 or 30 years down the road (ibid).

- Even if scoliosis is not presently a concern, heavy backpacks certainly can cause pain, aches, fatigue, and numbness.
- Physicians say that those children who already have scoliosis should never carry heavy loads on their backs or shoulders.
- The basic backpack design is fundamentally flawed because it requires its wearer to use 10% more energy than if using a satchel design (with the load distributed in the front and rear of the body). With the entire load in the back, it creates a force, a tendency for the back to want to fall backward. Resisting this force leads to adverse symptoms.
- Backpacks, when worn properly, are easier on the back than those types of bags that can only be carried on one shoulder (such as “messenger bags”).

13. How Heavy Is Too Heavy?

- A 1997 study of 11- and 12-year-olds by the London-based National Back Pain Association found that 80% were wearing backpacks improperly and that some were hauling as much as 60% of their own body weight (cited in *Washington Post*, September 14, 1999)!
- Experts say that one should carry a backpack weighing up to 15% of your body weight and never more than 20% (*Washington Post*, September 14, 1999).
- The following are the recommended limits set forth by the ACA (American Chiropractic Association), the APTA (American Physical Therapy Association), and the AAOS (American Academy of Orthopedic Surgeons):

Person's Weight (lb.)	Maximum Backpack Weight (lb.)
60	5
60-75	10
100	15
125	18
150	20
200 or more	25*
*No one should carry more than 25 lb.	

14. Ways To A Better Backpack

- The backpack should have wide, padded straps. A waist belt is a good idea also, especially if it’s going to carry a lot of weight (it takes pressure off the neck and shoulders).
- Both shoulder straps should be worn to better distribute the weight.
- The backpack should have good padding on the area that rests against the back.

- A backpack with several compartments can also distribute the load better. Pack the heavier items closer to the back. Pointy and bulky items should not rest against the back (even with padding).
- The backpack should be positioned so that it hangs just below the shoulders and rests on the hips and pelvis. If it hangs below this, it will more likely cause strain.
- There's no need to carry absolutely everything one owns in a backpack (unless perhaps if there are no lockers). Frequent trips should be made to the locker to get only the objects that are currently needed. Other items should be placed back in storage. Another option would be to store the entire backpack, with the exception of the necessary items.
- There should be different bags for different activities. For example, one should carry a separate bag for athletics—there's no use in carrying workout clothing to chemistry class. The separate bag should remain in storage until it needs to be used.
- If possible, separate copies of heavy textbooks should be kept at home, so that they don't have to travel between home and school every day.
- Avoid very large backpacks with many compartments. These will only encourage the user to store more items in them—otherwise, they may look “empty.”
- Look into current innovations of backpacks: Saddlebags, backpacks with curved or molded backs and bottoms, inflatable air bags, handles, wheels, and interior rack frames. Take a look at the [Posture Pack](#). Just make sure they fit in the traditional locker.
- As parents, try to get involved in making school safer for children. Encourage the school to give students two sets of heavy textbooks, one for home and one for school. If there are no lockers, or if they have been taken away, explain to the school the dangers of carrying heavy backpacks.

[References cited in the School Guide](#)

(Guidelines information compiled by Marisol Barrero and Alan Hedge, 3/2000)

Source: Cornell University Ergonomics Web; <http://ergo.human.cornell.edu/default.htm>

Also, check out the International Ergonomics Association website - [Ergonomics for Children and Educational Environments](#) and the [Ergonomics for Kids](#) web site.

