Ergonomics in the Classroom: Position for Learning

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www.gatfl.org

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TOOLS for LIFE
Georgia's Assistive Technology Act Program

WATAP

www.amacusg.org

Ergonomics in the School Environment

Promoting full inclusion in educational environments often includes knocking down simple physical barriers by building up everyone's skills and knowledge of the principles of ergonomics and understanding of assistive technology solutions. This presentation will identify ergonomic challenges present in the classroom environment and will provide solutions that can assist with improving posture and enhance the student’s ability to focus on learning and promote inclusion.

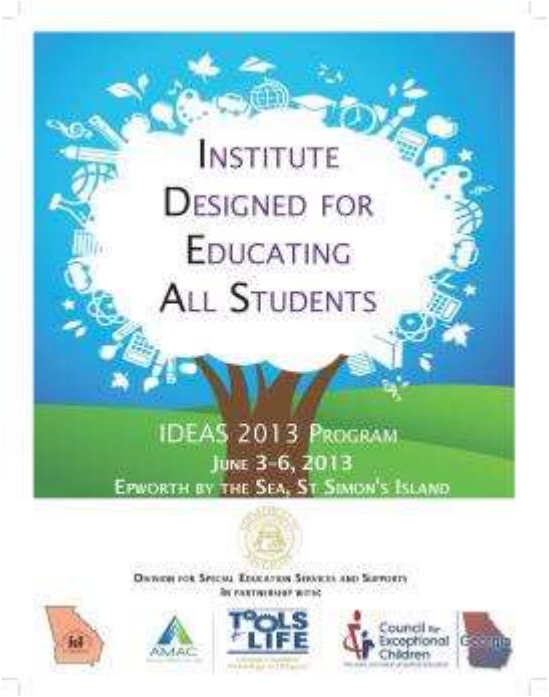
Position for Learning

Session Goals:

1. Promote full inclusion of all students in educational environments.
2. Increase participants skills and knowledge in assistive technology and ergonomics.
3. Provide resources for participants so they can educate others and create inclusive classrooms and educational settings.

Agenda

1. Welcome & Introductions – AMAC/TFL & WATAP
2. Define & Explore Ergonomics
3. Position for Learning:
   - Classroom
   - Computers
     - Laptops
   - Mobile devices
4. Position for Eating
5. Position for Playing & participating:
   - Physical education
   - Carnival
6. Other Considerations:
   - Backpacks
7. Tips & Resources
   - Stretch!



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AMAC Accessibility is a social change organization on a mission to create affordable services for governmental, private and non-profits organization working with individuals with disabilities. Services include e-text, braille, captioning, assistive technology, office management software and consulting.

Accessibility Made Smart

AMAC creates practical solutions that work, with a focus on utility, ease of use, and high quality.

- **Accessibility Consulting** focuses on organizational accessibility needs with evaluation, technical assistance, customer support, and website accessibility solutions.
- **Braille Services** produces customized projects from both print materials and electronic text including partial books and chapters or graphics only using cutting-edge technology.
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Tools for Life Mission

We’re here to help Georgians with disabilities gain access to and acquisition of assistive technology devices and assistive technology services so they can live, learn, work, and play independently in the communities of their choice.

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Georgia’s Assistive Technology Act Program

University of Washington
Center for Technology and Disability Studies

- UWCTDS is an interdisciplinary program within the Center for Human Development and Disability and the Department of Rehabilitation Medicine.
- Projects supported by grants from the U.S. Department of Education, U.S. Health and Human Services, and other funding sources.
- UWCTDS provides research, education, training, policy analysis, and legal advocacy related to assistive technology and accessible information systems.

Washington Assistive Technology Act Program
Washington's Federal AT Program

- Provide Assistive Technology resources and expertise to all Washingtonians with disabilities
  - Demonstration
  - Lending
  - Training
  - Re-Use
- Goal to assist with decision making and obtaining the technology and related services needed for employment, education and independent living.

What is Ergonomics

- Greek word: Laws of Work
- Science that studies work in various environments, and the tools used to perform tasks in those environments
- Goal: match the capabilities and “limitations” of the human body

Areas of Concern for Students

- Educational Environments
  - Classroom
  - Cafeteria
  - Playground
- Computers
- Mobile devices
- Backpacks
- Recreation
  - Electronics/gaming

When is an evaluation needed

- Proactive/Prevention
- When working posture is affecting performance, attention, and creating pain
- **TIP:** Consider incorporating ergonomic principles into the IEP to support educational goals.
  - Helps with breathing, circulation, attention, concentration & ultimately learning
  - Must consult with a trained professional
  - Educate everyone – student, family, teachers, parapros

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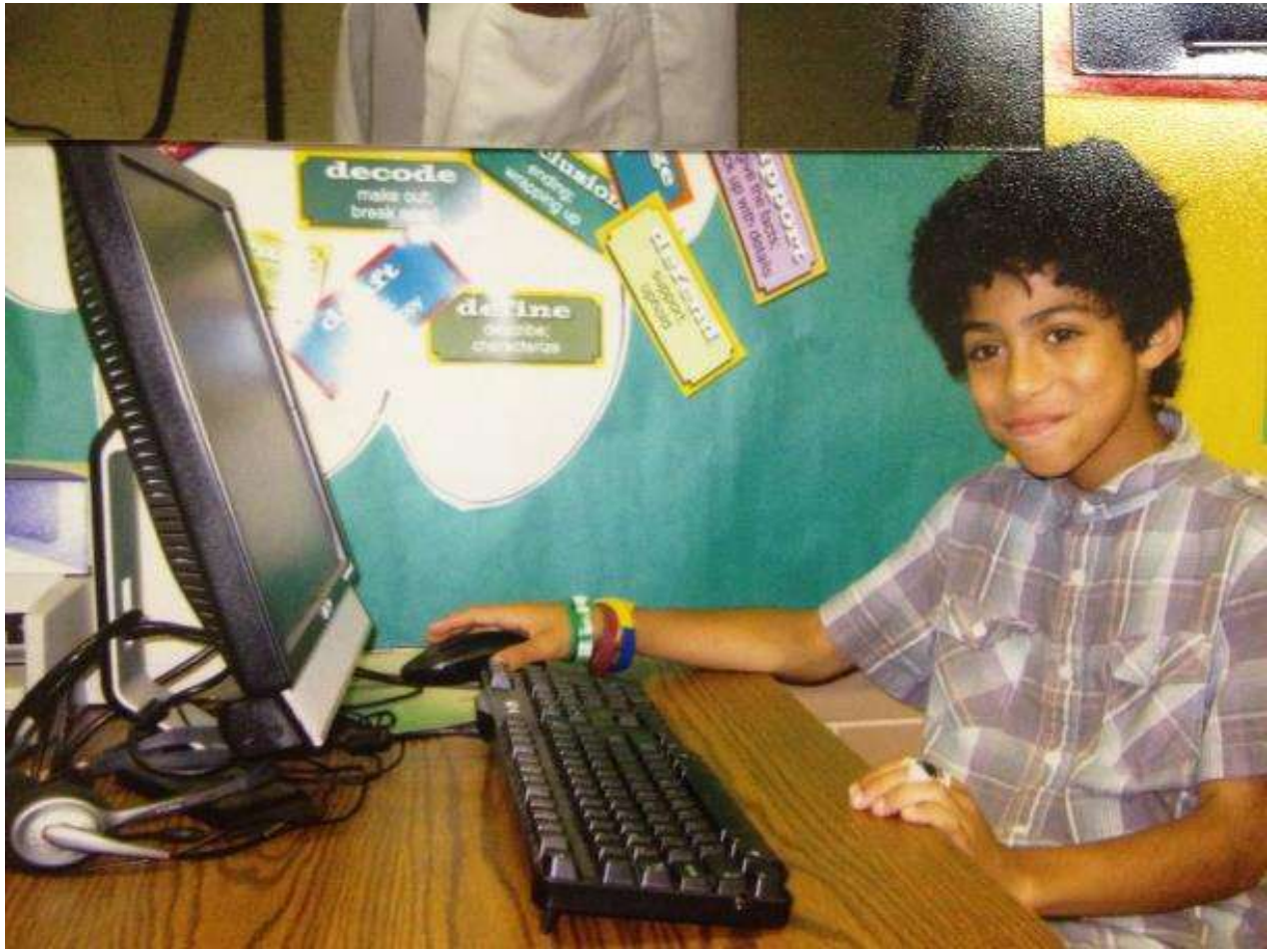
Computers



Ergonomics in the Classroom
Areas to Evaluate

- Chair
- Monitor
- Desk
- Keyboard & mouse

Poor Sitting Posture

- Inhibits blood flow
- Creates muscle shortening
- Stresses back muscles and compresses spine
- Can inhibit learning
- Compresses diaphragm
  - Affects breathing
  - Voice quality

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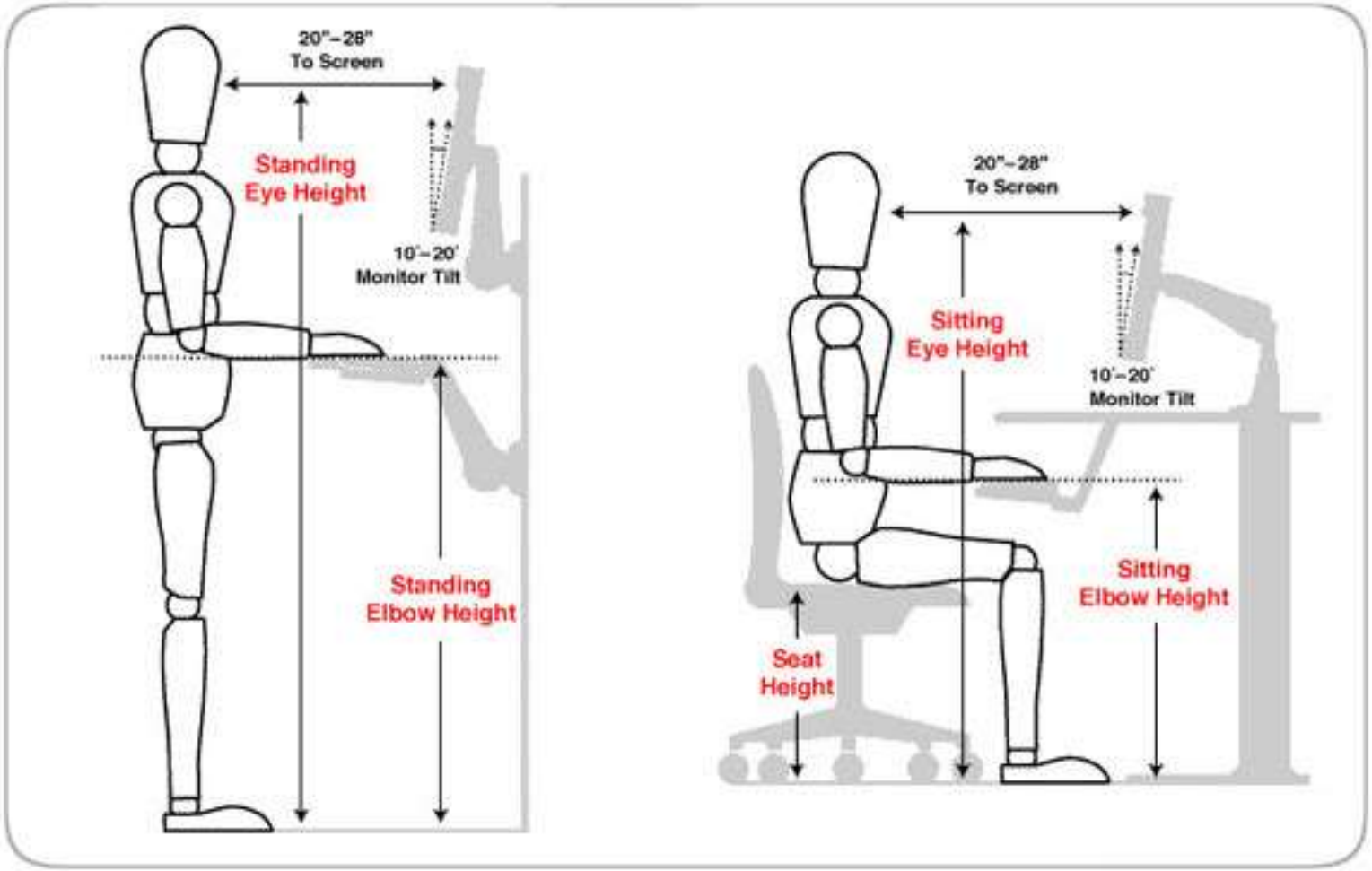
Ergonomics in the Classroom



Ergonomics in the Classroom

Stand Up For Your Health
Physiologists And Microbiologists Find Link Between Sitting And Poor Health

June 1, 2008 — Physiologists analyzing obesity, heart disease, and diabetes found that the act of sitting shuts down the circulation of a fat-absorbing enzyme called lipase. They found that standing up engages muscles and promotes the distribution of lipase, which prompts the body to process fat and cholesterol, independent of the amount of time spent exercising. They also found that standing up uses blood glucose and may discourage the development of diabetes.

ScienceDaily®
Your source for the latest research news

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Chairs

- Proper height for desk or height adjustable if possible
  - boost height in a non-adjustable chair
- Thighs should not be in contact with the front edge of the seat
  - 2” to 3” between front edge of chair and back of knees
  - Use firm pillows or cushions to reduce seat depth
- Adjust the chair so feet are flat on the floor and thighs parallel to the floor
  - use foot rest or seat cushions to achieve proper posture
- If child is wheelchair user feet should make good contact with footplates

Low cost solutions

- Portable back and seat cushions
- Small pillow or rolled up towel to support low back
- Booster seats, pillows or phonebooks, boxes

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Unsupported feet

Low cost solution

Good Posture

(Cornell University Ergonomics)

Options

$125

$116

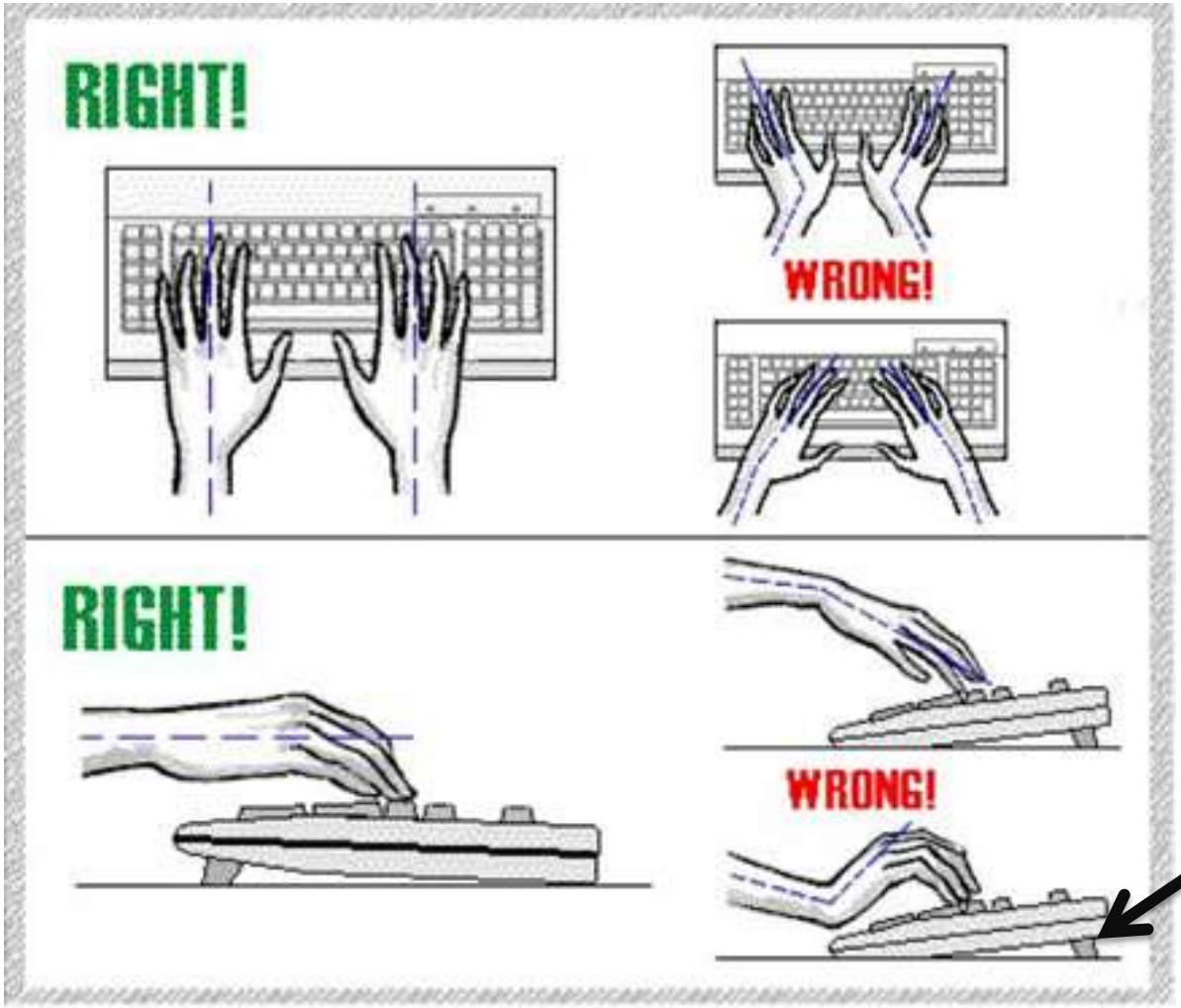
Head posture

- Upright
- Centered/close to midline as possible
- Adjust equipment to improve head alignment

Upper Extremity Positioning

- Mouse and keyboard surfaces should be on the same plane
- Position close to the user's body to eliminate shoulder strain and neck pain
- Elbows should be kept at a 90 to 100 degree angle
- Avoid bending the wrists when typing; Keep wrists in neutral
- Keyboard trays can help position devices at correct height

Ergonomics in the Classroom



Don’t use

Mouse Devices

- Smaller mouse options can help with control
- May need device that is switch accessible
- Or device that requires no hand or wrist movement & light touch

Tiny Mouse; http://www.chestercreek.com/TinyMouseOptical.html; $15

Cruise Adapted Trackpad
www.infogrip.com; $400

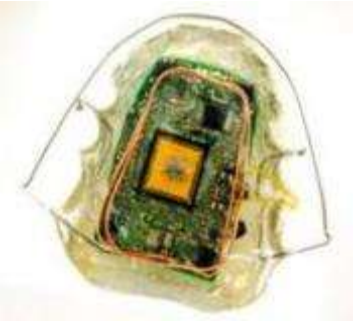
Big Track; www.infogrip.com ;$80

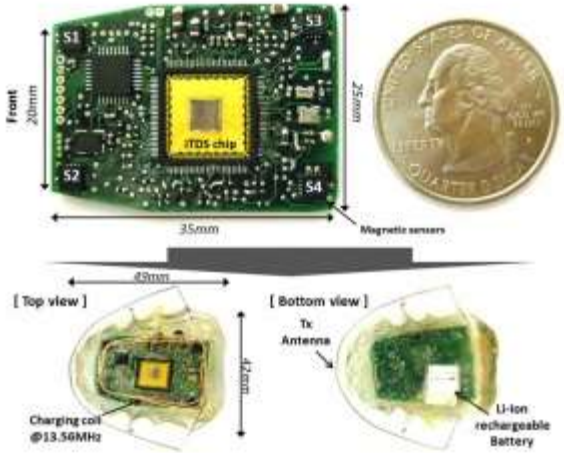
DXT Fingertip
Vertical Wireless Mouse

- Ergonomic Relaxed Neutral Wrist and Hand Position
- Precision Grip for Accurate Navigation
  - Small muscles and joints of the fingers have higher processing abilities
- Instantly Switches Between Right and Left Hand
- Video

Tongue Drive System

- Wireless device that enables people with high-level spinal cord injuries to operate a computer and maneuver an electrically powered wheelchair simply by moving their tongues
- dental retainer embedded with sensors
- detect movement of a tiny magnet attached to the tongue
- Testing with iPods and iPhones





- *GA Tech*
- *Shepherd Center and Rehab Institute of Chicago*

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Products / New Products

ASL brings innovative products to our clients! We are here to help each client reach their full potential – our team creates products and designs as a direct result of the needs of those we serve. Our goal has always been independence and equal rights for those we work with....

Driver Control Packages

100 Series

ASL 138 Extremity Control Joystick

Electronic Switches

200 Series

ASL 215 Round Proximity Sensor with Mono Port and 24 Volt Connector

Electronic Switches

200 Series

ASL 215 Round Proximity Sensor 3 Pin

Specialty Products & Adaptors

Specialty Products & Adaptors

Specialty Products & Adaptors

Keyboards

- Larger keys can increase access for students with visual or motor difficulties
- $70-$100

Keyboards

- Compressed/mini; 77 keys
- Smaller footprint beneficial for one handed users
- $35-50

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Ergonomics in the Classroom

Ergonomics in the Classroom

Writing Solutions:

- “The Penagain takes a novel ergonomic approach to ink pen design. The body of the pen is shaped like a "Y" creating a cradle for the index finger to rest in.” http://ergonomics.about.com/od/buyingguide/fr/frpenagain.htm

- Wide barrel pens can make it easier for some people to write due to their contoured shape. With a Fat Ergonomic Pen there’s more surface area to grip which makes it easier to write.

Live Scribe Pen

- Records what it hears and what you write
- Uses specific paper for playback
- Connects to computer by USB for saving
- Tap on note and playback from there
- Jump forward and back in notes
- Dictionary
- Translation Apps
- Purchase Apps online
- Demo

Video Screen Microscope

- Digital Microscope that captures videos and pictures
- Internal Memory and SD Card Slot
- LED Lighting
- 3.5 inch color screen

VGo Telepresence Robot

- Enables a person to replicate themself in a distant location and have the freedom to move around as if they were physically there
- Reduces travel costs
- School
- Hospital
- Work from home

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Position for Learning: Students with Attention Issues

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Movement Helps Learning!

- 2003 study in *American Journal of Occupational Therapy* concluded that students with ADHD using ball chairs were able to sit still, focus and write more words legibly

- 2007 Mayo Clinic study concluded that a chair-less classroom increased attention and improved learning

- 2008 University of Central Florida study
  - children need to move to focus during a complicated mental task
  - especially those with attention-deficit/hyperactivity disorder (ADHD)—fidgeted more when a task required them to store and process information rather than just hold it.

Dump the chair?

- Engages core muscles
- Less impulsivity
- Increase focus

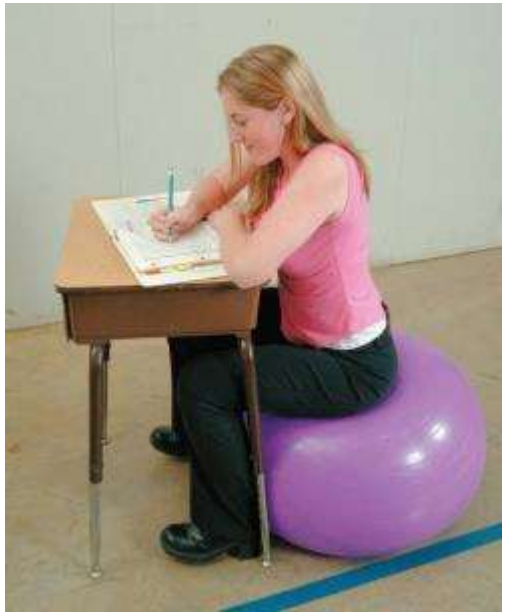
Height	***Recommended ball size***
Under 4'8"	45 cm ball
4'8'' to 5'3''	55 cm ball
5'4'' to 5'10	65 cm ball
5'10 to 6'4	75cm ball

For kids 5 years and younger, always use a 45 cm ball.
(Exercise Balls for Dummies)

Other options

Move Small Ergonomic Stool for Children

Seating Disc



Stay n place ball

Fidget Footrests

- Standing desks can help students who find sitting still difficult
- Use of dynamic footrests can help release energy and improve focus

http://classroomseatingsolutions.com/products.html

Mounts and Work Surfaces

- Sit/stand desks
- Tilt Desks
- Portable mounts for devices
- Adjustable monitor arms

Tilt Desks

- Positioning the work closer to the student can improve visual access
- Promote upright trunk posture
- Improve head posture

Desktopdesk.com; $375

Tilt Desks

TherAdapt Extended Easels; $288

Study Pal; $42

Mounts

RAM

RAM

ErgoMart

(RJ Cooper Magic Arm)

Gaming….The thumbs have it!

Mobile devices

Can also contribute to poor posture and repetitive motion injuries

Neck strain, nerve compression

Mobile devices

- Explore various mounting options to hold mobile devices
- Helps with posture
- Operate wheelchair or other mobility aid safely
- Builds confidence
- Then you can text Carolyn & Maria all the time!

Mobile devices

- Should be accessible for type of selection process
  - Direct selection with hands
  - Stylus
  - switches
- Use mounts to improve upper extremity and visual access

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TFL AppFinder

Search by:

- ✓ **App Name**
- ✓ **Categories**
  - Book
  - Education
  - Environmental Adaptations
  - Hearing
  - Cognition, Learning, Developmental
  - Navigation
  - Personal Care and Safety
  - Productivity
  - Communication
  - Therapeutic Aids
  - Vision

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Bridgit

- Use with SMART Board interactive whiteboard
- Display to view content that is being presented and highlight or annotate over that content.
- Create or join a meeting on iPad
- Free

SmartNotebook for iPad

- Works with SmartNotebook 11 software for Smartboards
- Dropbox and Google file Integration
- Asynchronous collaboration
- Insert photos and sounds

- $6.99

Splashtop Whitboard

- Allows teachers and students to turn their iPad into an interactive white board
- Allows movement around the classroom
- Spotlight and Screen Shade tools for focus
- $19.99

SkyGrid

- Personalize news events by categories
- Simple interface
- Free
- www.skygrid.com

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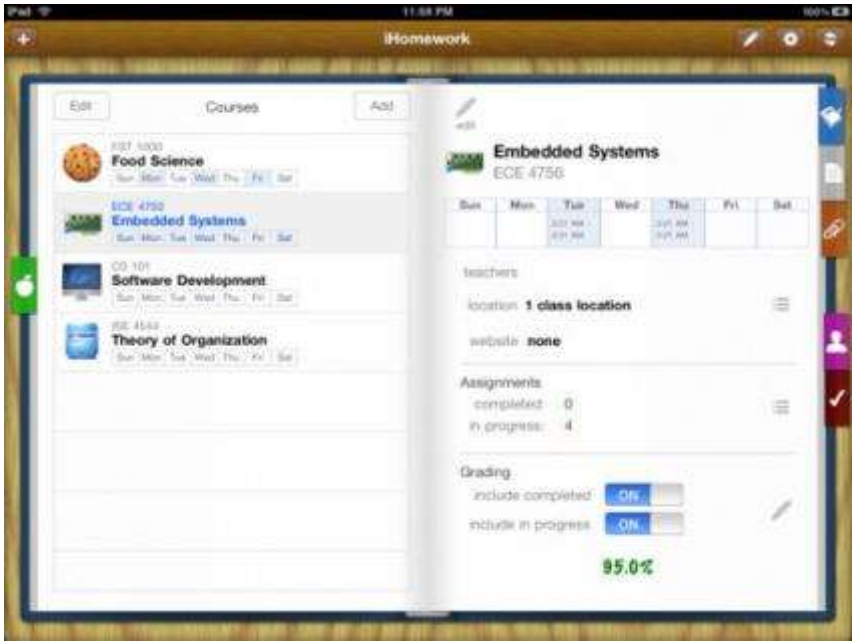
iHomework



- Keep up-to-date with your school work, grades, to-do's, teacher's information
- School organizer that can be with you anywhere you go, whether that be on your iPhone/iPod touch, iPad, or Mac
- $1.99

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Position for Eating

- Let's consider how ergonomics in the cafeteria can affect a student:
  - Posture
  - Safety
  - Inclusion & Making friends

Position for Eating

- **Posture**
  - Poor ergonomics, like the examples that we discussed, can directly affect a student's ability to independently eat meals at school.
  - Leaning to one side or the other
  - Positioning arms out of reach
  - Feet that are not supported

Position for Eating

- **Safety**
  - Poor posture in general, but especially while eating can lead to diminished breathing. When shoulders are rounded or not balanced they can restrict expansion of the rib cage/breathing diaphragm. Inhalation is compromised.
  - Eating while fatigued, under stress or when you are rushed can slow down the digestive process leading to future health problems such as challenges to the immune system.
  - Head positioning can directly affect swallowing. Poor head positioning, leaning to one side or the other, forward or back, can cause choking and aspiration.

Position for Eating

- **Inclusion**
  - Often, poor ergonomics while eating results in a quick and sometimes not necessary solution for this activity - provide a Parapro.
  - Lunch time is a wonderful social activity for students. This is a time where they can relax, have conversation, and be with their friends.
  - Children with that sense of belongingness are not feeling excluded. They are more likely to be able to focus and feel comfortable at school.

Automatic Feeder

- Mealtime Partner
- Different mounts
- Battery operated
- Bowl tops controls amount of food
- Control Pause time between spoonful
- Adjustability of the spoon

Picture of the Mealtime Partners Mounted on the Support Arm

Individuals who have limited range of upper body control or who fatigue easily from the effort of controlling their body movement should use *the Partner* mounted on the Support Arm. The Support Arm allows *the Partner* to be positioned so that the spoon, when extended out from the device, is positioned very close to the user's bottom lip. With *the Partner* positioned this way, the user only has to lean forward slightly to take food off of the spoon, thus the user exerts very little effort.

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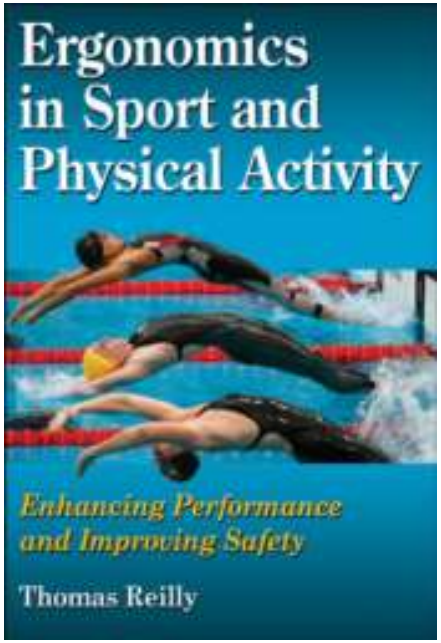
Utensils

Ergonomics in Sport & Physical Activity



- *Ergonomics in Sport and Physical Activity: Enhancing Performance and Improving Safety* is the first text to provide an in-depth discussion of how the principles of ergonomics can be applied in the context of sport and other physical activities to reduce injury and improve performance. The text blends concepts from biomechanics, physiology, and psychology as it shows how ergonomics is applied to physical activity.

  This comprehensive text outlines methods for assessing risk in and procedures for dealing with stress, eliminating hazards, and evaluating challenges posed in specific work or sport environments. It discusses issues such as the design of effective equipment, clothing, and playing surfaces; methods of assessing risk in situations; and staying within appropriate training levels to reduce fatigue and avoid overtraining. The text not only examines sport ergonomics but also discusses ergonomic considerations for physically active special populations.

  Ergonomics in Sport and Physical Activity explains what ergonomics is, how ergonomists solve practical problems in the workplace, and how principles of ergonomics are applied in the context of sport and other physical activities when solving practical problems related to human characteristics and capabilities. The text shows readers how to improve performance, achieve optimal efficiency, enhance comfort, and reduce injuries by exploring topics such as these:
  Essential concepts, terms, and principles of ergonomics and how these relate to physical activity

- Physical properties of the body and the factors limiting performance

- Interactions between the individual, the task, and the environment

- Injury risk factors in relation to body mechanics in various physical activities

- Injury prevention and individual protection in the review of sports equipment and sports environments

- Comfort, efficiency, safety, and details of systems criteria in equipment design

Ergonomics on the Playground & PE

- Safety
- Inclusion
- Fun!

Power Fish’n

- Electronic power assist fishing reel
- Attaches to a fishing pole
- One finger push

Back Packs

(Google image)

Back Packs

Pack too big and majority of weight on tailbone

stress on shoulder & neck; asymmetrical posture

Backpack Maximum Weight Chart (for Children)

According to The American Physical Therapy Association, American Academy of Orthopedic Surgeons, and the American Chiropractic Association

Weight of Child (in pounds)	Maximum Backpack Weight
60	5
60-75	10
75-100	15
100-125	18
125-150	20
150-200	25

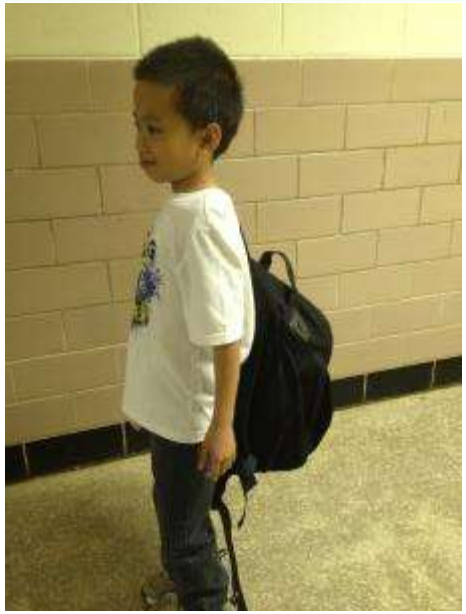
No one should carry more than 25 lbs. in a backpack.

Back Packs

1. **Two Straps**
   - Make sure the bag has two straps. Single strapped bags, like satchels and duffel bags, should be avoided. A single strap places the entire load on one side of the body.
2. **Size**
3. **Wide, Padded Straps**
   - Wide straps distribute the load over more area of the shoulder. Padding spreads the load as well as alleviates any pressure points.
4. **Padded Back**
   - The back should be padded as well.
5. **Lightweight**
   - The bag should be light. The lighter the better.
6. **Waist Strap**
   - It dramatically helps direct the load away from the shoulders and onto the much stronger waist and hip muscle groups. chance of back pain.
7. **Compartments**
   - Having a bag with several compartments helps in two ways.
8. **Chest Strap**
   - A strap across the chest from shoulder strap to shoulder strap is a small, but worthwhile improvement. It also fights the urge to slouch.

Back Packs

- Size of the backpack should fit the child
- Both straps should be used
- Bottom of the pack should not sag and rest on the buttocks
- Don’t overload
- Consider using rolling backpacks



BackTpack

- Ergonomically redistributes the weight of carried loads between two compartments
- Hip-loading belt
- Magnetic closures
- Easy access to items
- Sit strap
- Lightweight/water resistant nylon

http://www.bapingroup.com/; $63 to $100

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Resources

Preparation for the Future

- Compliance & Progress
- Save Energy
- Ready for the Workplace
- Let your environment work for you!

Preparation for the Future

- Compliance & Progress
  - Proper positioning will become habit and will provide comfort that will help to shape compliance over the years.

Preparation for the Future

- Save Energy
  - Muscles have to work extra hard just to hold you up if you have poor posture, leaving you without energy.
  - Work smarter, not harder!

Preparation for the Future

- Ready for the Workplace
  - All of the solutions, helpful tools and strategies that I learned in school are helping me to be successful today!
  - Let your environment work for you!

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- http://www.desktopdesk.com/purchase.html

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Our Question to You:
What have You Learned today?

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