Ergonomics in the Classroom: Position for Learning

Maria Kelley, Carolyn Phillips and Liz Persaud
www.gatfl.org

IDEAS @ St. Simon's Island
June 2013

AMAC
Accessibility for All

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.

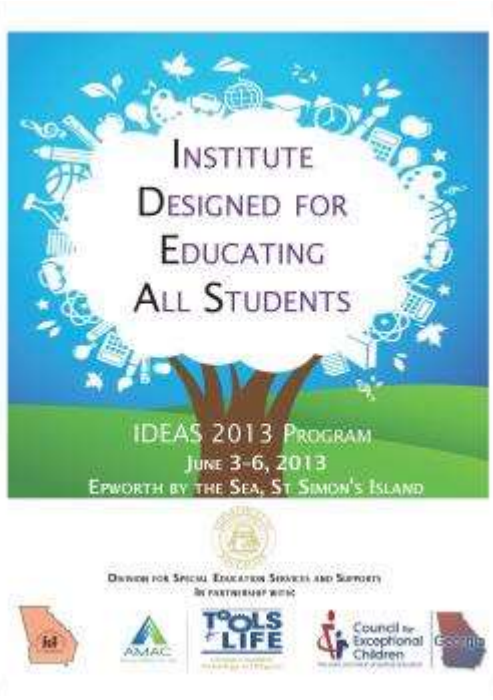
Position for Learning

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!



AMAC

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.
- **Captioning Services** makes classrooms, meetings, labs and other audio environments fully accessible for deaf or hard-of-hearing.
- **Professional E-Text Producers** provide high-quality e-text in many formats such as PDF, DOC, DAISY, and HTML.
- **Certified Assistive Technology team** provides on-site and remote assessments, demonstrations, training and technical assistance for education, work, and daily living environments.

For more information, please visit our website at www.amacusg.org

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.

Georgia’s Assistive Technology Act Program

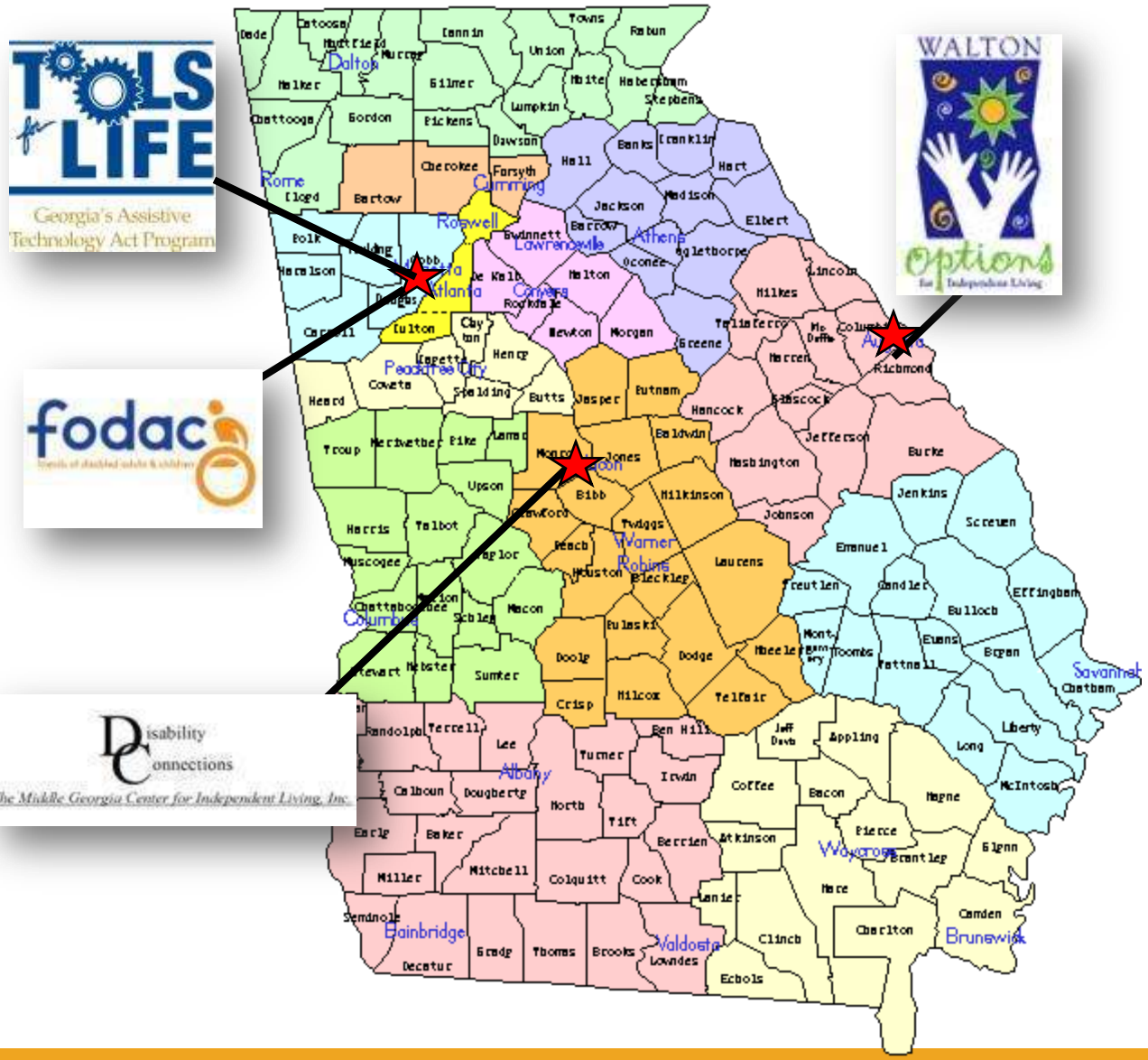
Tools for Life

Georgia's Federal AT Act Program

- TFL developed Georgia's Plan for AT
- We serve individuals of all ages & all disabilities in Georgia
  - Over 50,000 thru various activities throughout the year
- TFL Network
  - Assistive Technology Resource Centers
  - Lending Libraries
  - Training and Demonstrations
  - AT Reuse
  - AT Funding Education/Assistance and Resources
- Online Resources
  - www.gatfl.org - 12,000 unique visitors a month

Tools for Life Network

- AT Lending Library
- AT Evaluations & Training
- AT Demos
- Resource and Assistance
- AT Funding Assistance
- DME Reuse



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.

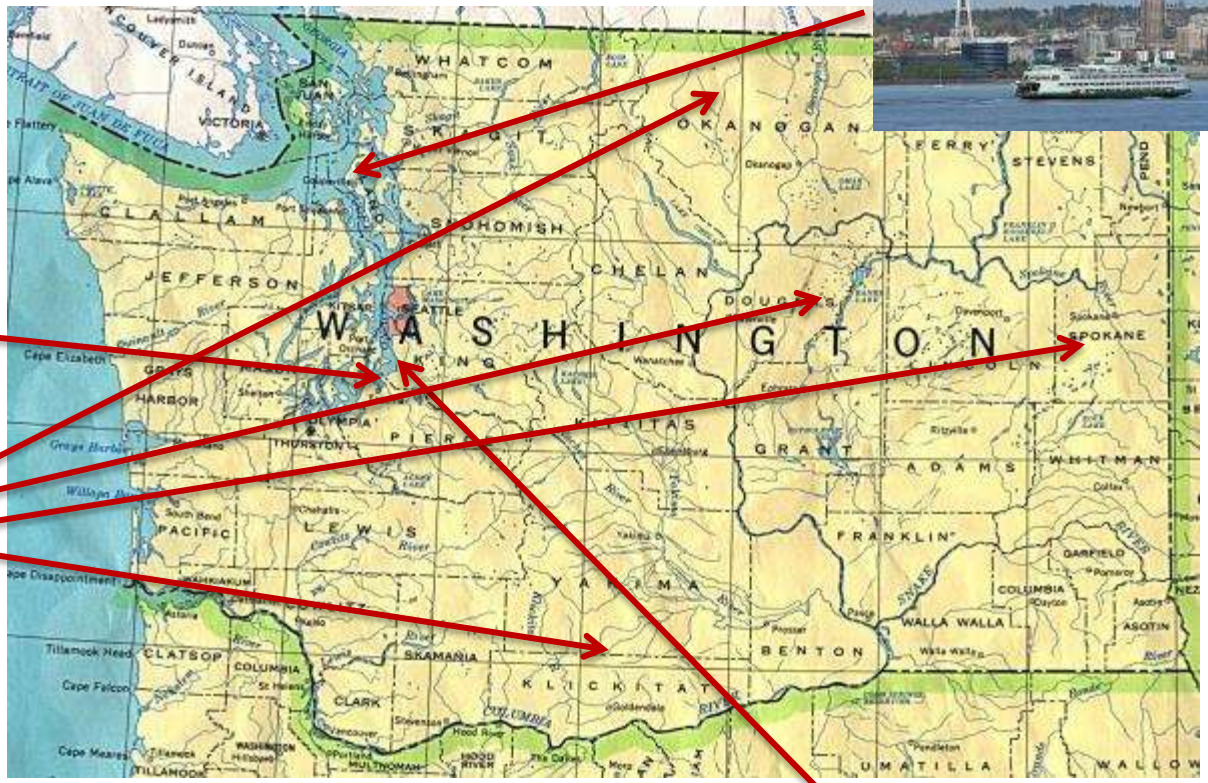
Washington Assistive Technology Act Program
Washington's Federal AT Program

- 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.

Where do we come from?

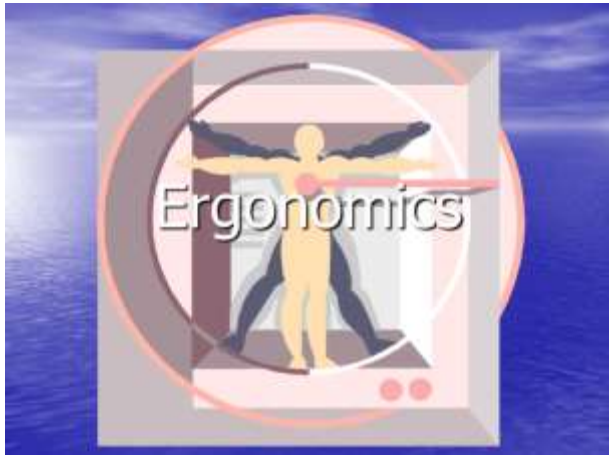
Some say we Northwesterners come right out of the woods.

And our Network….



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

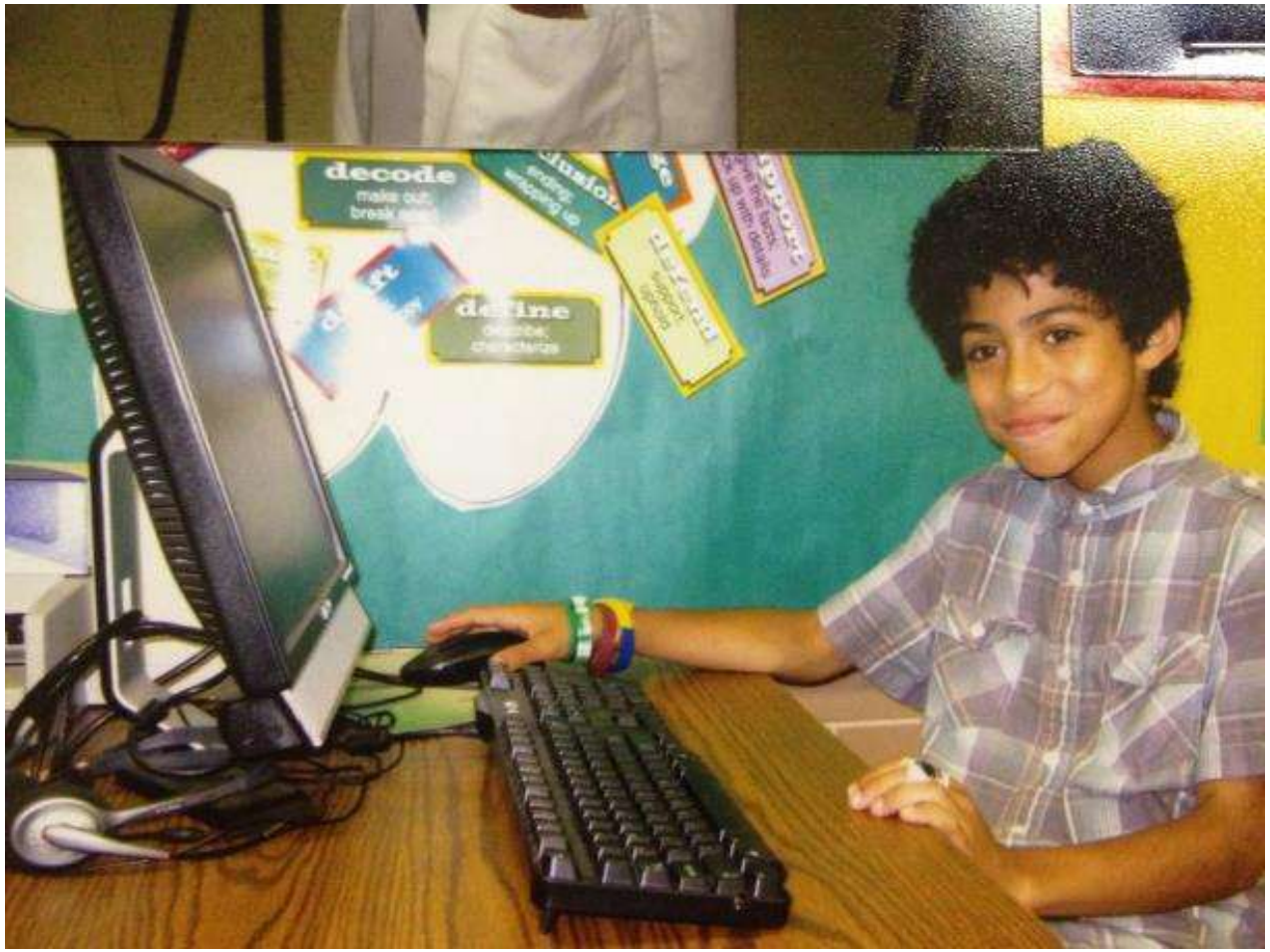
- Educational Environments
  - Classroom
  - Cafeteria
  - Playground
- Computers
- Mobile devices
- Backpacks
- Recreation
  - Electronics/gaming

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

AMAC
Accessibility for All

Computers

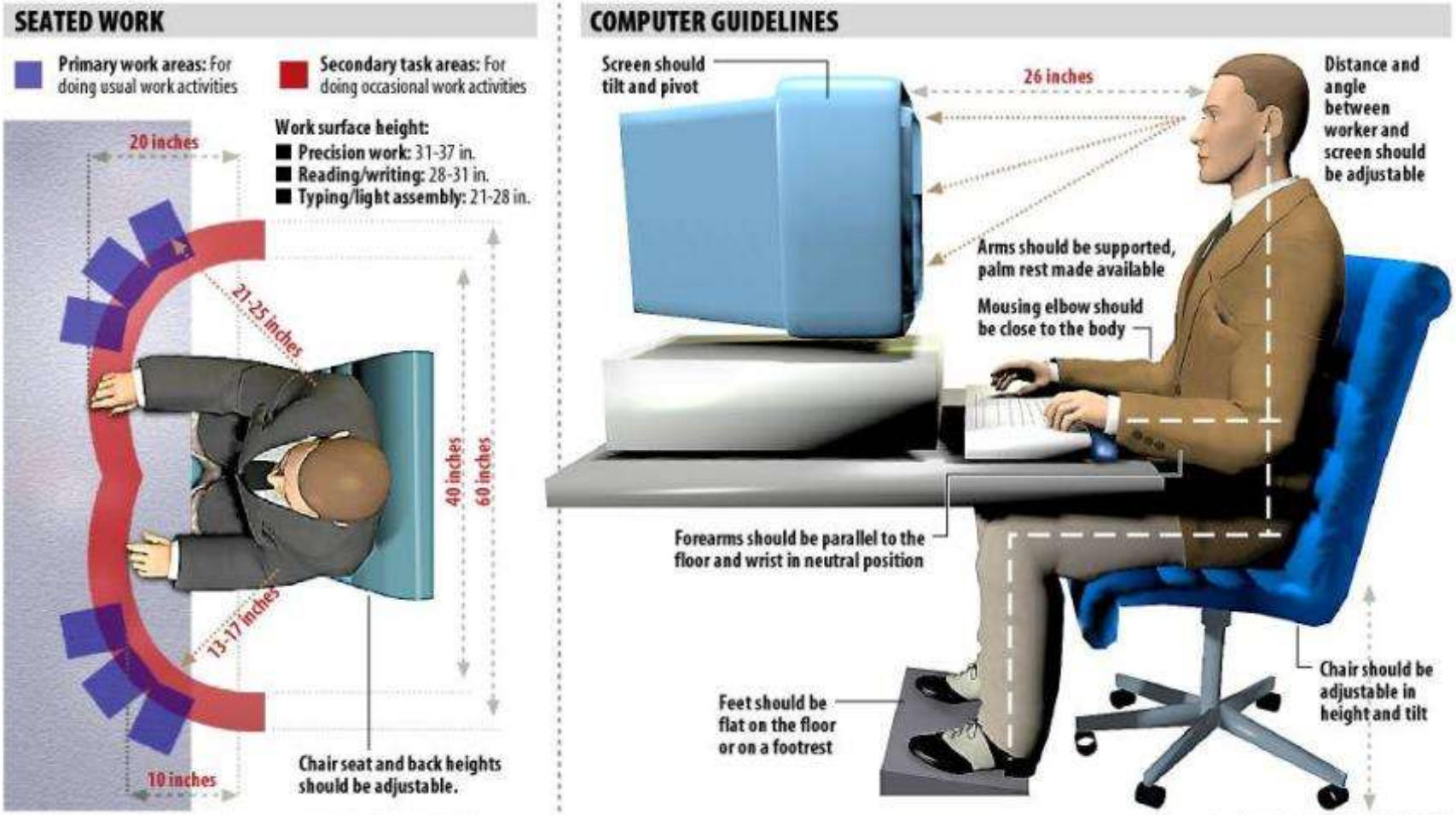


AMAC
Accessibility for All

Ergonomics in the Classroom

Sitting correctly

A look at the correct way to sit at the office:



SOURCE: National Institute for Occupational Safety & Health

Staff graphic/CHRIS JOHNSON

Ergonomics in the Classroom
Areas to Evaluate

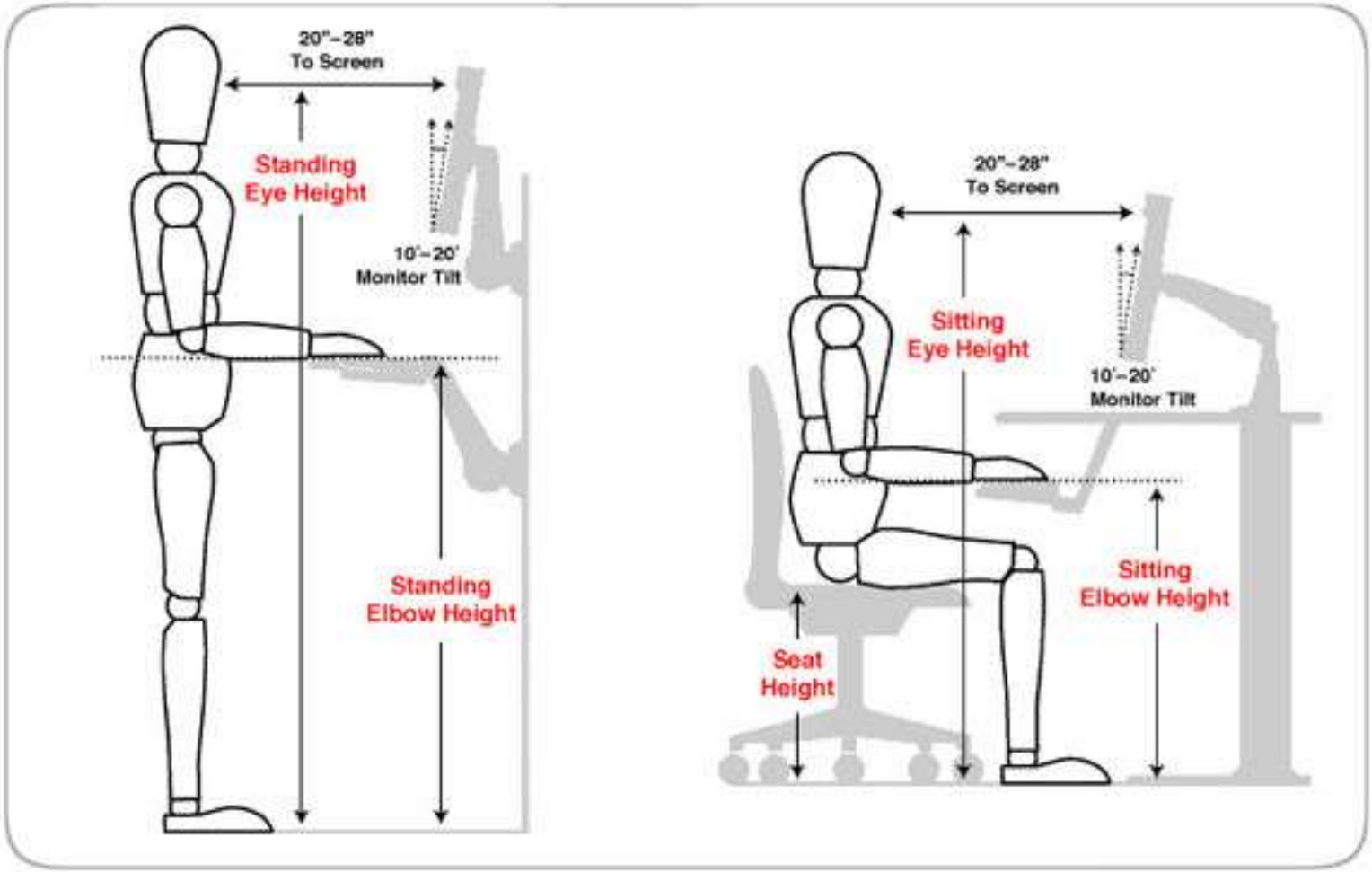
- Chair
- Monitor
- Desk
- Keyboard & mouse

Poor Sitting Posture

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

AMAC
Accessibility for All

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

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

AMAC
Accessibility for All

Unsupported feet

Low cost solution

AMAC
Accessibility for All

Good Posture

(Cornell University Ergonomics)

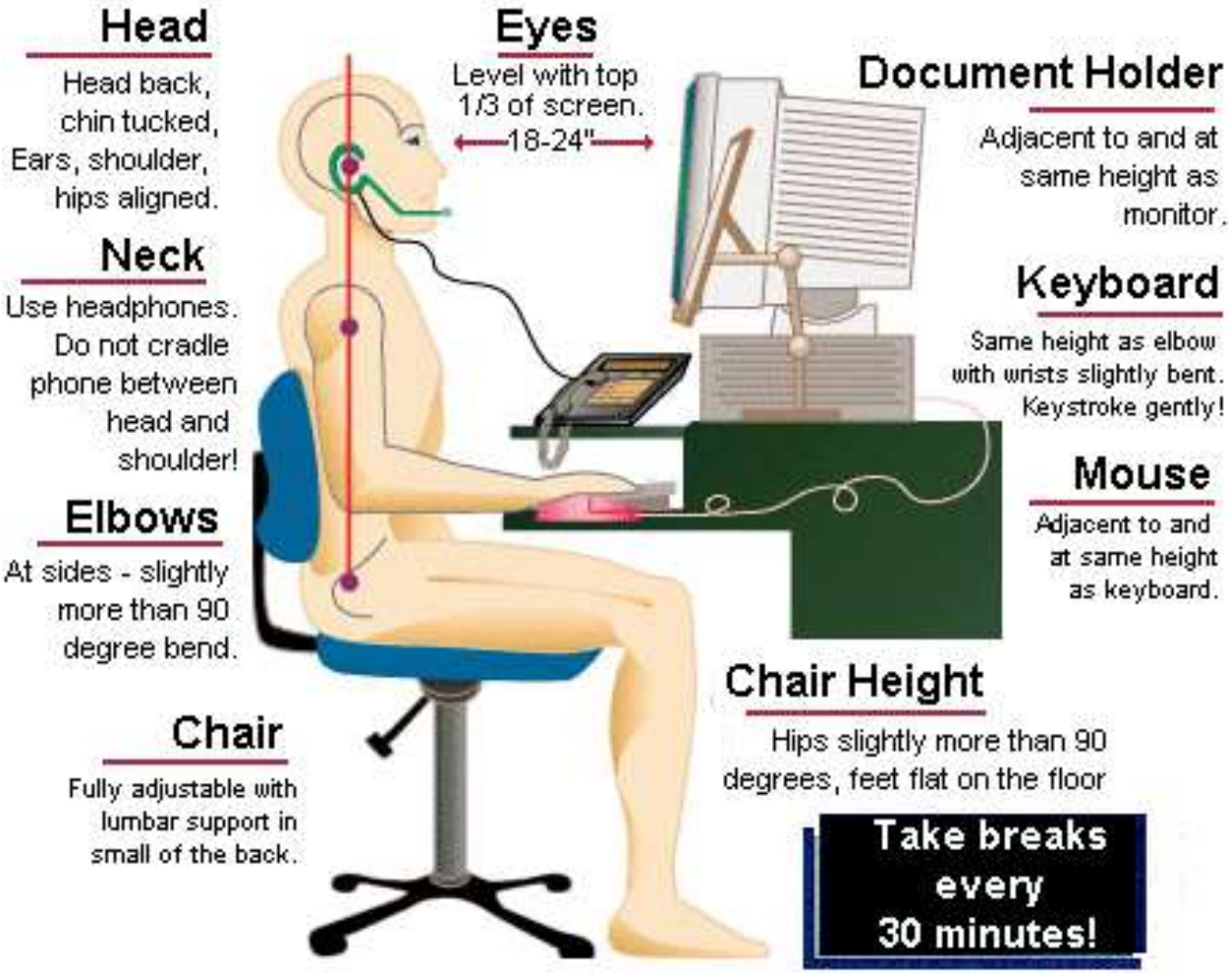
Options

$125

$116

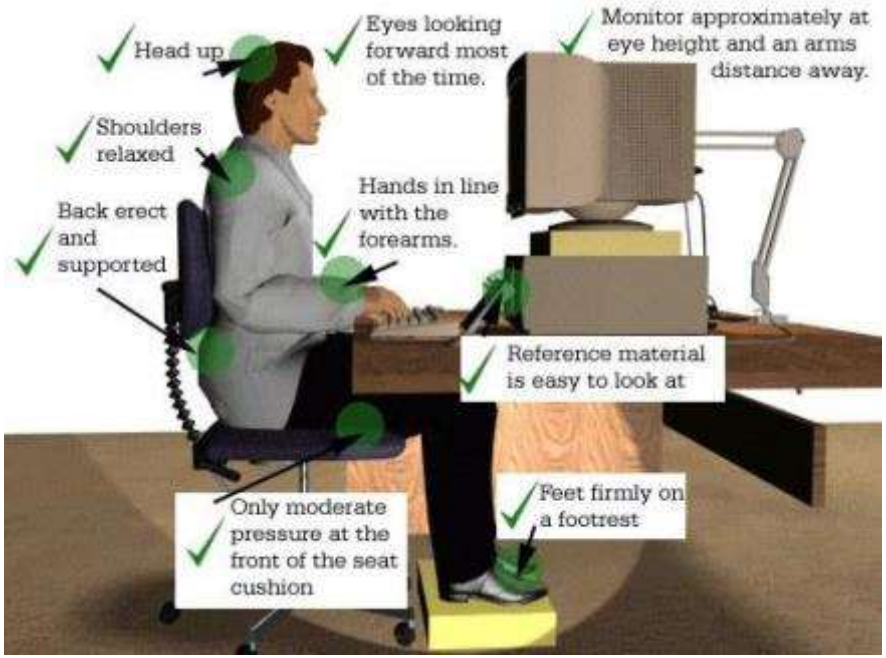
AMAC
Accessibility for All

Ergonomics in the Classroom



Monitor

- Centered on desk
- The top of monitor should be at eye level allowing text on screen to be at or slightly below eye level
- Positioned arms lengths away unless visual acuity issues
- Use document holders
- Minimize glare



Head posture

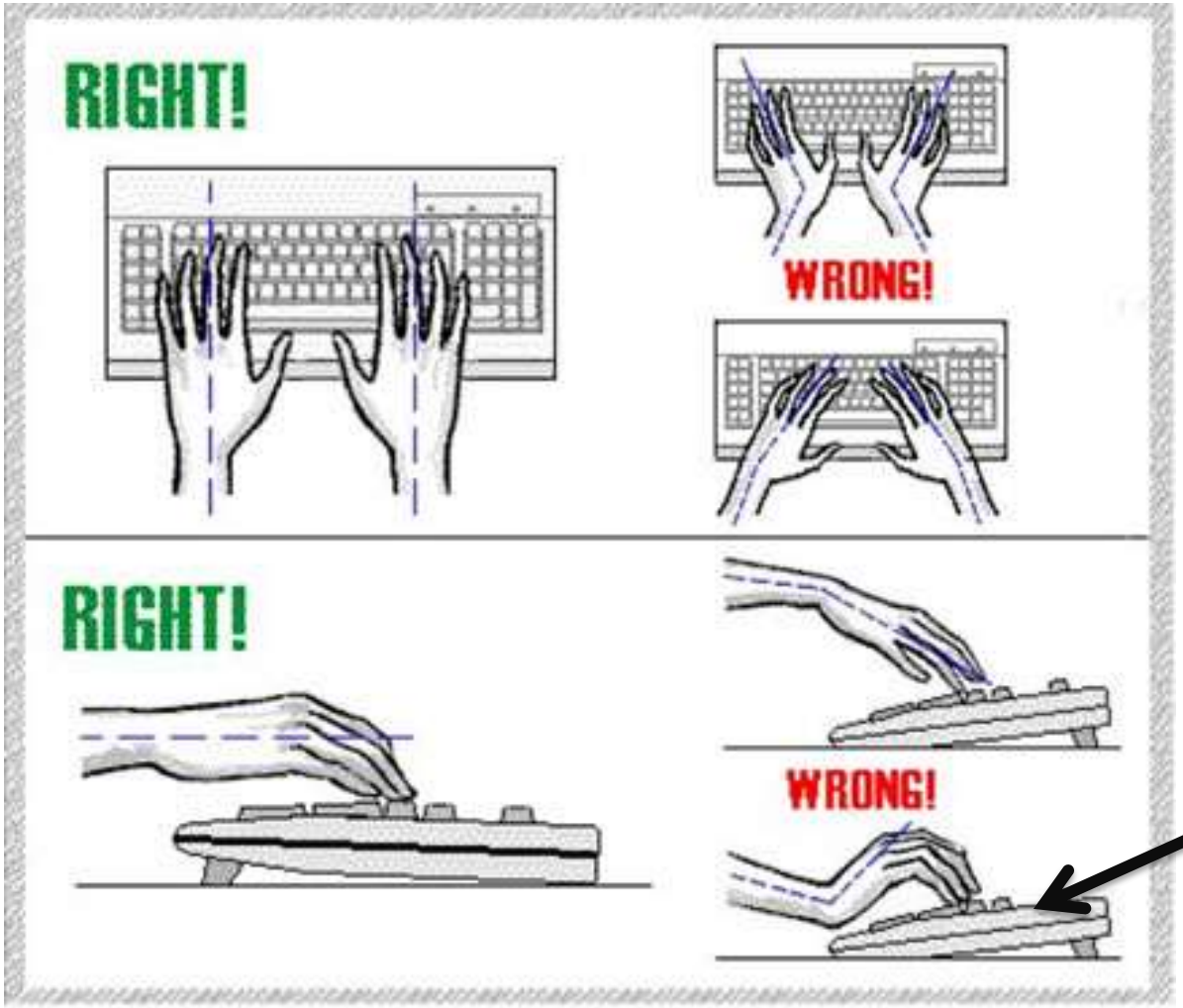
- Upright
- Centered/close to midline as possible
- Adjust equipment to improve head alignment

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

AMAC
Accessibility for All

Ergonomics in the Classroom



AMAC
Accessibility for All

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.

Ergonomics in the Classroom

Writing Solutions:

- "Stabilo's goal is to make writing and drawing easier, so they work closely with ergonomic and fine motor specialists to achieve the optimum ergonomics results. Their products low weight and ergonomic shape, the hand muscles do not tire too quickly, as only a light pressure is required, eliminating the pain of hand cramps. Their pen and pencils even encourage good posture, which can improve academic performance in children and students." https://www.thewritingpenstore.com/c-307-easyergo-s-move-easy.aspx

- The Free Ride's vibrant and sleek metal frame is perfectly balanced with the neutral hand placement grips. https://www.thewritingpenstore.com/c-295-free-ride-ergonomic-pens.aspx

Position for Learning:
Students with Attention Issues

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

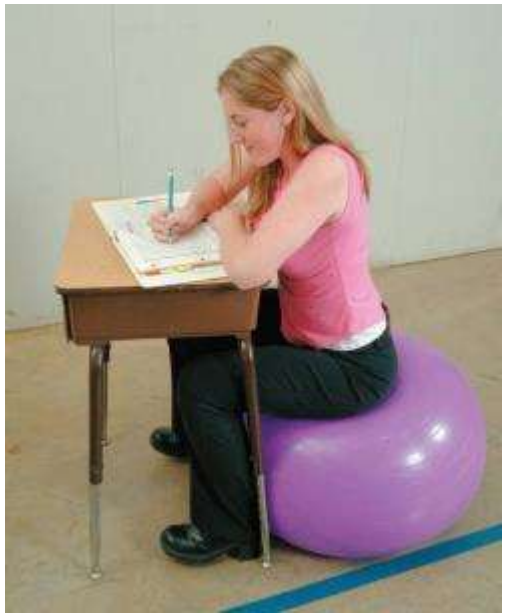
Height	***Recommended ball size***
Under 4'8"	45 cm ball
4'8'' to 5'3''	55 cm ball
5'4'' to 5'10	65 cm ball
5'10 to 6'4	75cm ball

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 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)

AMAC
Accessibility for All

Gaming….The thumbs have it!

Mobile devices

Can also contribute to poor posture and repetitive motion injuries

Neck strain, nerve compression

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

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

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

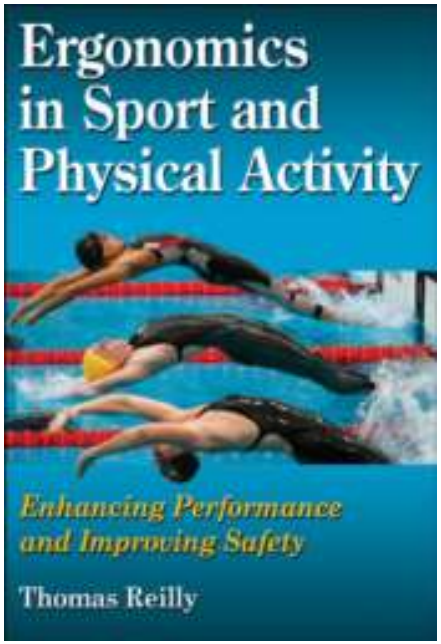
Position for Eating

- **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.

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!

Ergonomics at the School Carnival

- Safety
- Inclusion
- Fun!

AMAC
Accessibility for All

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

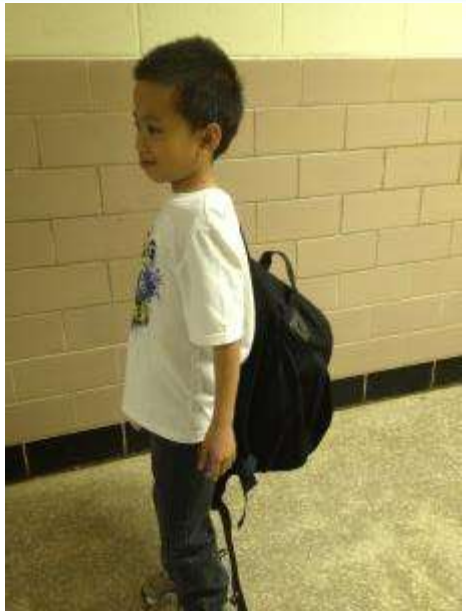
No one should carry more than 25 lbs. in a backpack.

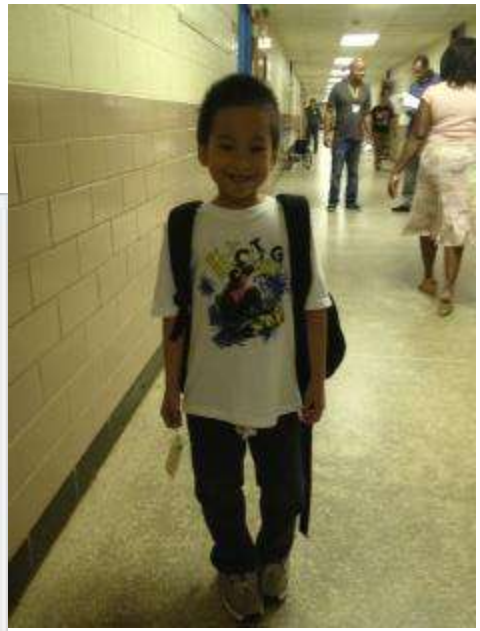
Back Packs

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



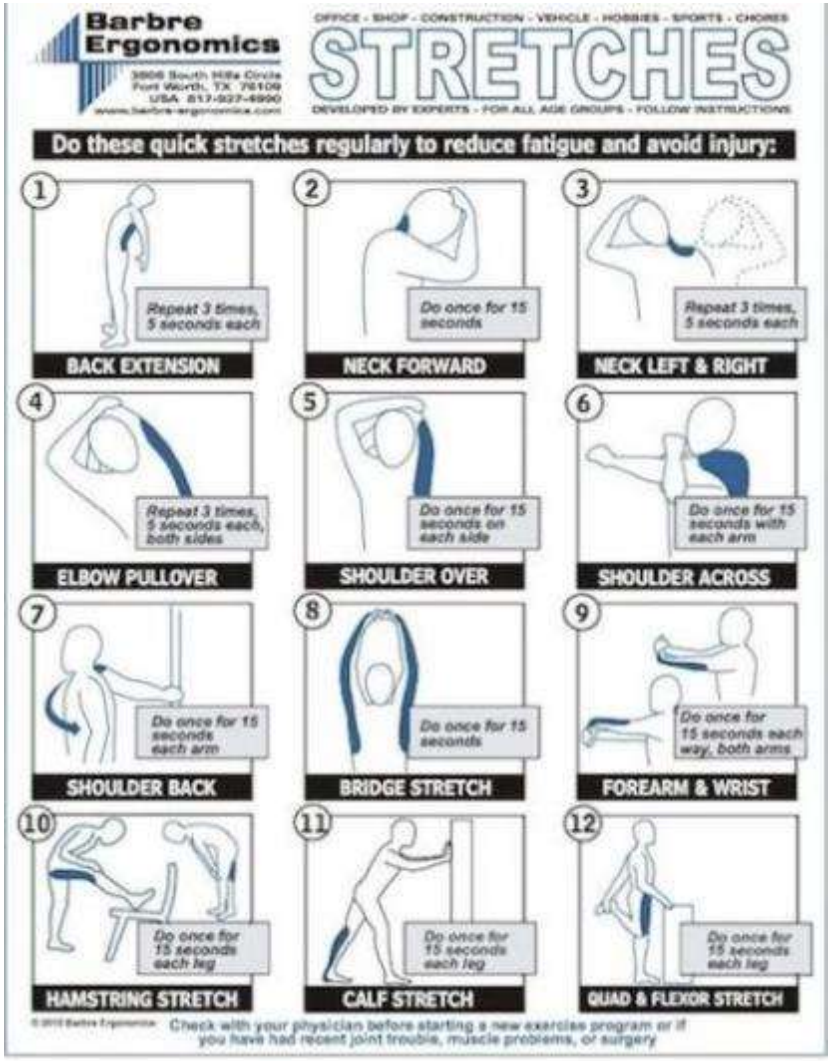


AMAC
Accessibility for All

Resources

AMAC
Accessibility for All

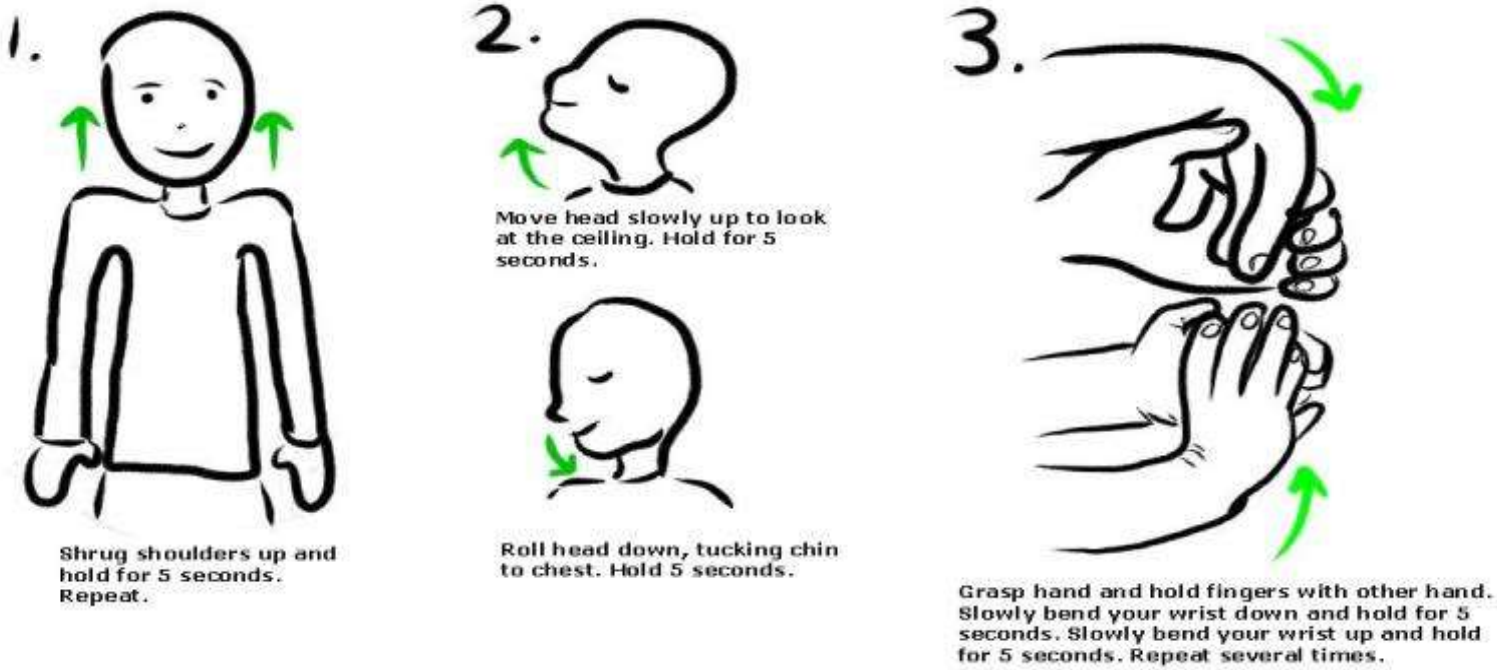
Stretch!



***Guidance from healthcare professional is recommended

Stretch!

Desk Stretches



***Guidance from healthcare professional is recommended

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!

References

- http://www.healthycomputing.com/kids/
- http://ergo.human.cornell.edu/cuweguideline.htm
- http://ergo.human.cornell.edu/cutodayimages.htm
- http://www.howtolearn.com/2012/08/backpacks-are-weighing-students-down
- http://ergonomics.about.com/od/ergonomicsforchildren/ss/bpweightchart.htm
- http://repetitive-stress-injury.blogspot.com/2012/07/we-discussed-office-ergonomics-in-last.html
- http://www.especialneeds.com/classroom-furniture-classroom-tables-chairs-adaptive-tables-chairs-jettstep-footrest.html
- http://www.classroomseatingsolutions.com/products.html
- http://kids-desks.ca/childrens-ergonomics.html
- http://pinterest.com/parko/positioning/
- http://www.therapro.com/Study-Pal-P4197C4192.aspx
- www.ergomart.com
- http://ajot.aotapress.net/content/57/5/534.abstract
- http://suite101.com/article/no-more-classroom-chairs-a34803
- http://www.time.com/time/magazine/article/0,9171,1889178,00.html
- http://www.desktopdesk.com/purchase.html

AMAC
Accessibility for All

TOOLS for LIFE
Georgia's Assistive Technology Act Program

Our Question to You:
What have You Learned today?

Contact

Maria Kelley

OT, Senior AT Specialist

mtkelley@uw.edu

Carolyn Phillips

Director of Tools for Life

Carolyn.Phillips@gatfl.gatech.edu

Liz Persaud

Training, Development and Outreach Coordinator

Liz.Persaud@gatfl.gatech.edu