ERGONOMIC AWARENESS IN SCHOOL

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INTRODUCTION

"That's the risk you take when you're an early adopter of new technology!"

Work can cause injury

"I'm sorry you got hurt on the job, but look at the bright side — you've finally got time to read the safety manual!"

Work injuries

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"Here's a card to a good chiropractor. By the looks of that chair, you're going to need it."

"CARP-el tunnel syndrome makes work difficult. My hands keep slipping off my jackhammer."

The study of work causing injuries to the person is called ERGONOMICS

"Your attention to ergonomics is getting out of hand."

WHAT IS ERGONOMICS?

The word "ergonomics" comes from two Greek words: "ergon" meaning work, and "nomos" meaning laws. Today the word is used to describe the science of designing the job to fit the worker, not forcing the worker to fit the job.

ergon: work
Original Word: ἔργον, ου, τό
Part of Speech: Noun, Neuter
Transliteration: ergon
Phonetic Spelling: (er'-gon)
Short Definition: work, labor, action, deed
Definition: work, task, employment; a deed, action; that which is wrought or made, a work.

nomos: that which is assigned, hence usage, law
Original Word: νόμος, ου, ὁ
Part of Speech: Noun, Masculine
Transliteration: nomos
Phonetic Spelling: (nom'-os)
Short Definition: a law, the Mosaic Law
Definition: usage, custom, law; in NT: of law in general, plur: of divine laws; of a force or influence impelling to action; of the Mosaic law; meton: of the books which contain the law, the Pentateuch, the Old Testament scriptures in general.

ERGONOMICS DEFINED

- **Ergonomics** is the science of fitting the job to the worker.

WHY ERGONOMICS EMERGED…?

- As early as 18th century doctors noted that workers who required to maintain body positions for long periods of time developed musculoskeletal problems.
- Within last 20 years research has clearly established connections between certain job tasks and RSI or MSD.

ERGONOMIC TERMS

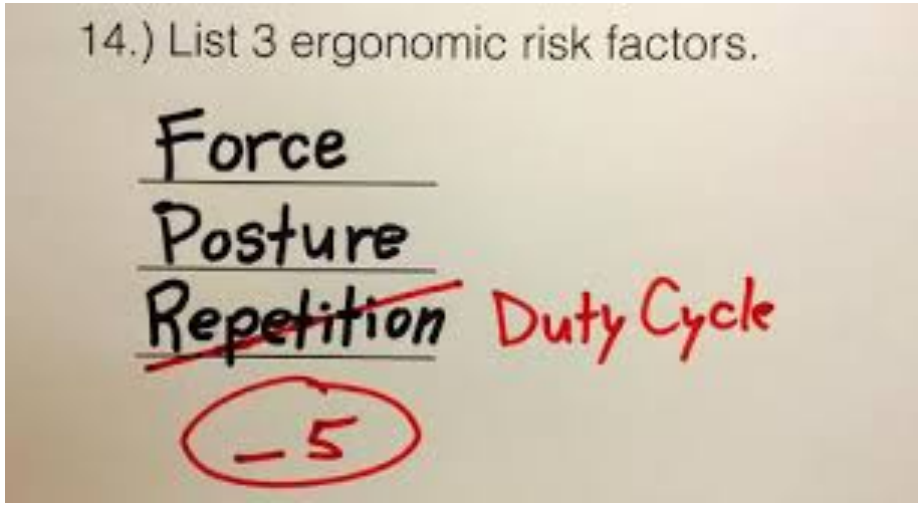
"I WAS GIVING A LECTURE ON INDUSTRIAL HEALTH AND SAFETY WHEN I TRIPPED OVER A MICROPHONE CABLE AND FELL OFF THE STAGE!"

HAZARD

Health hazard is the potential of a substance to cause harm or adversely affect health of people in the workplace

RISK

Risk is the likelihood that a substance will cause adverse health effects or illness in the conditions of its use.



Risk = [How x How Bad x How Much]

How = Hazard

How Bad & How Much = Exposure

MSD = CTD, RMI, RSI

Cumulative Trauma Disorder (CTD)

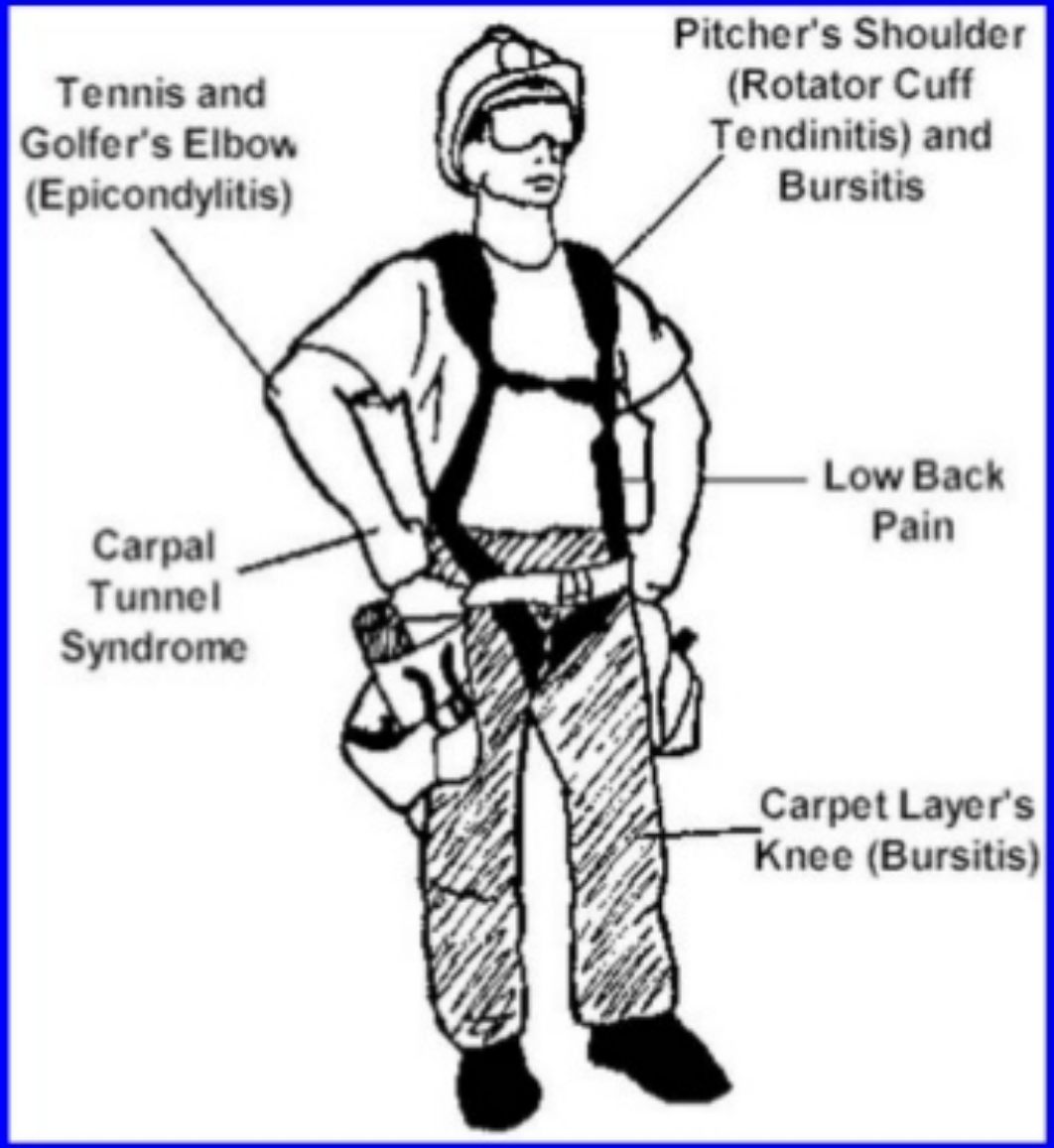
Repetitive Motion Illness (RMI)

Repetitive Stress Illness (RSI)

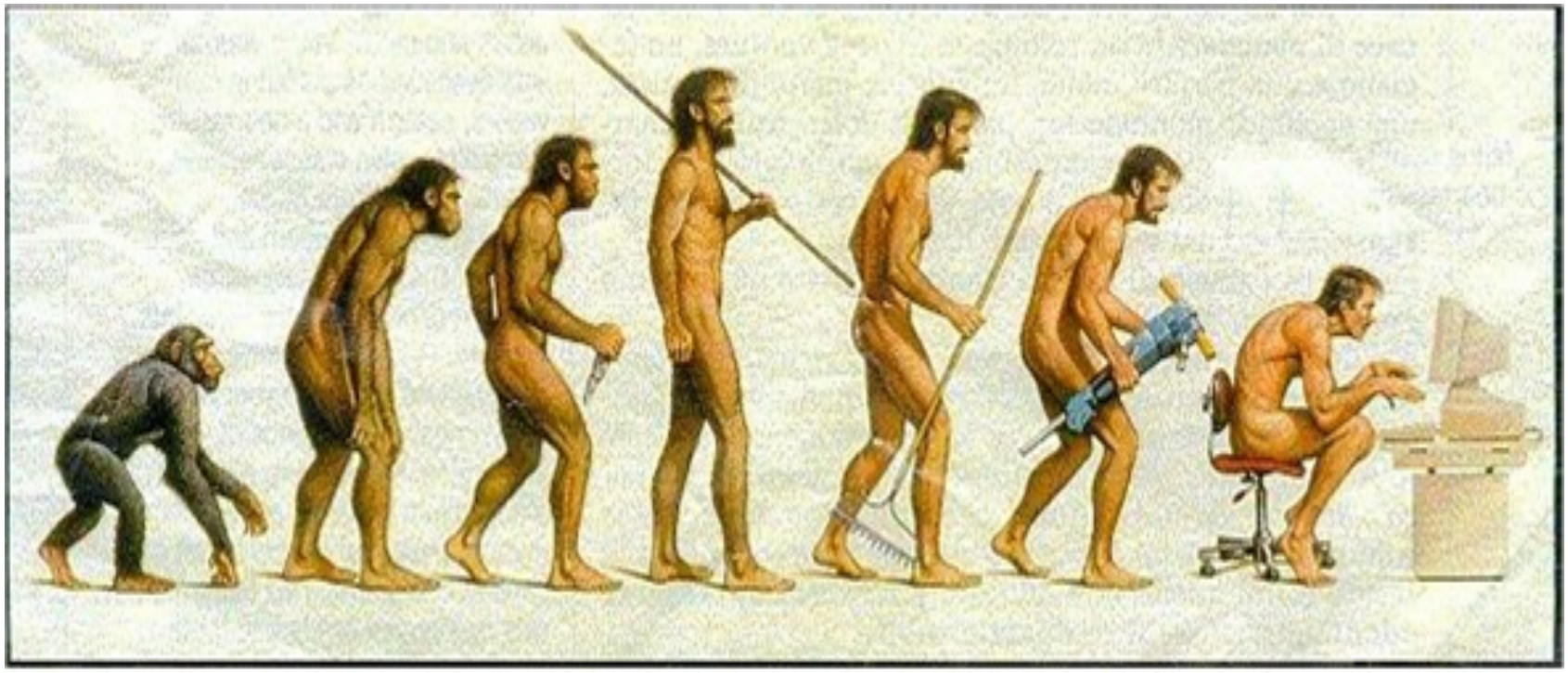
Whatever the name, they occur over time. They differ from injuries such as cuts, bruises or the like which occur suddenly.

ERGONOMICS

Work-Related Musculoskeletal Disorders (WMSDs) are occupational disorders that involve soft tissues such as muscles, tendons, ligaments, joints, blood vessels and nerves



Ergonomics: Evolution or Devolution?



Somewhere, something went terribly wrong

A school is a place of work

School Ergonomics
SCHOOLBAGS

Carrying schoolbags may contribute to low back pain in children

"YOU'RE LUCKY. WHEN I WAS YOUR AGE, I DIDN'T HAVE A FANCY BACKPACK TO TOTE MY BOOKS."

Secondary school children carry backpacks around 7.0kg

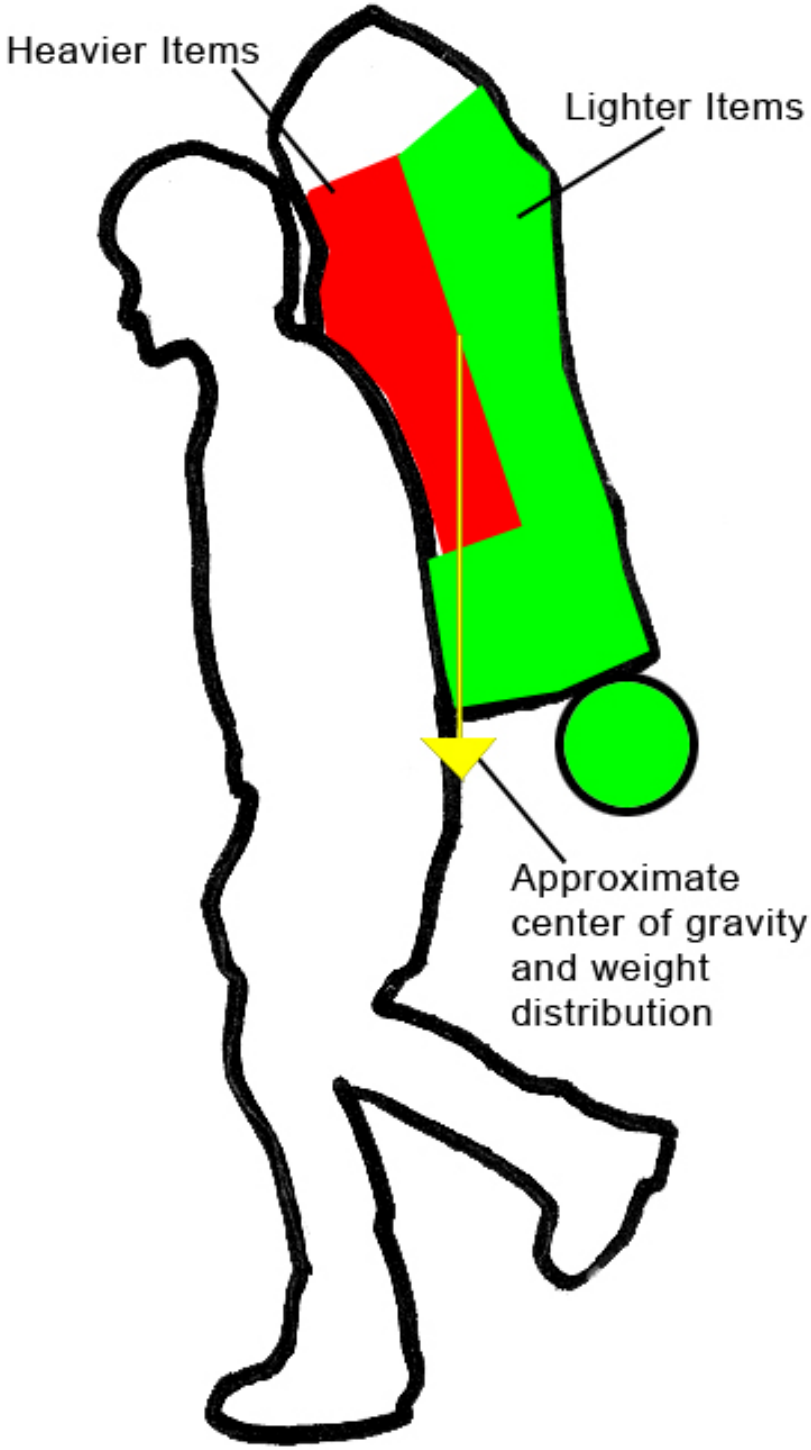
ABSTRACT Regular use of heavy school bags and inappropriate carrying methods can put children at the risk of musculoskeletal problems and changes the body posture. This study set out to determine the prevalence of musculoskeletal pain and their relationship with school bags weight. This cross sectional exploratory study was conducted in different elementary schools in Chennai, South India. A total of 510 elementary school children comprising of 297 boys and 213 girls aged between 6 to 12 years participated in the study. Each pupils body weight and school bag weight were measure using standard technique. The ratio of pupil's school weight to body weight was calculated and used to estimate the percentage weight of school bag in relation to body weight and the participants also completed a designed questionnaire to identify prevalence of pain. **A high prevalence of musculoskeletal pain 60.6% and 65.7% among male and female elementary school children** respectively was reported and the most common area being back and neck. A significantly positive association was found between percentage of school bag weight and presence of musculoskeletal pain among the children ($P < 0.05$). The study results were in line with the prevalence of primary school children of many developing countries and below par with some African studies owing to different educational demands.

Table no: 02

Pain characteristics of the participants

Type of Pain	Male (n=297)	Female (n=213)
Pain in at least one part of body	60.6%	65.7%
Neck pain	29.2%	27.9%
Shoulder pain	18.8% 1	2.4%
Back pain	**39.0%**	**36.3%**
Elbow pain	9.4%	11.4%
Hand and wrist pain	15.1%	16.8%
Thigh pain	21.2%	23.5%
Knee pain	17.5%	15.4%
Foot and ankle pain	5.3%	6.7%

The maximum load should be 15% of body weight



Factors that contribute to MSIs from school bags:

- *Heavier school bags*
- *Longer carriage durations*
- *Carrying additional bags*
- *Lack of access to lockers*

Choosing the right school bag:

- Ensure the bag is appropriate for the age and size of the carrier
- Select a pack with padded shoulder straps
- Choose a bag with a waist belt
- Carry no more than 15% of body weight
- Load heaviest items closest to the child's back
- Choose backpacks with several compartments
- Consider a bag with wheels
- Always wear both shoulder straps
- Adjust shoulder straps so the bag fits snugly to the back

School Ergonomics

FURNITURE

Challenges presented by children:

Range of body sizes

Rate of growth

Strength capabilities

Cognitive characteristics

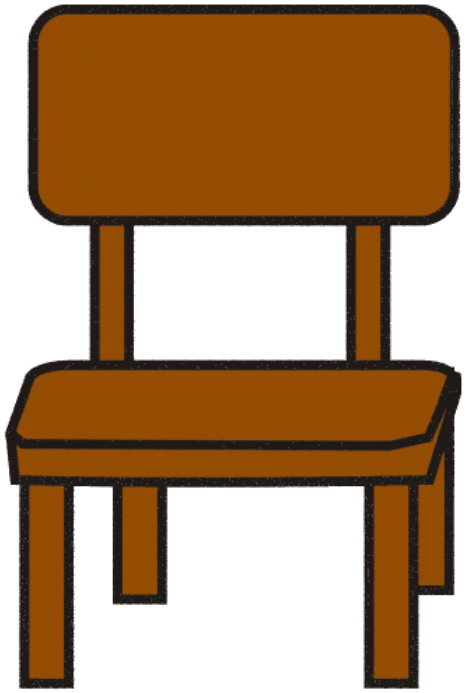
Different sizes of second grade children

Over 83% of school children sit at chair-desk combinations which are not suitable for their body height

School children spend around 9 hours sitting per day

Most school furniture is out of date and does not conform to minimum orthopedic-physiological requirements

Conventional chairs have a rigid seat that inclines backwards and merges into a seating



CHAIR

Must be suitable for the child's anthropometric data as well as their varying work postures

- Needs to allow for sitting with movement

Two suggested designs:

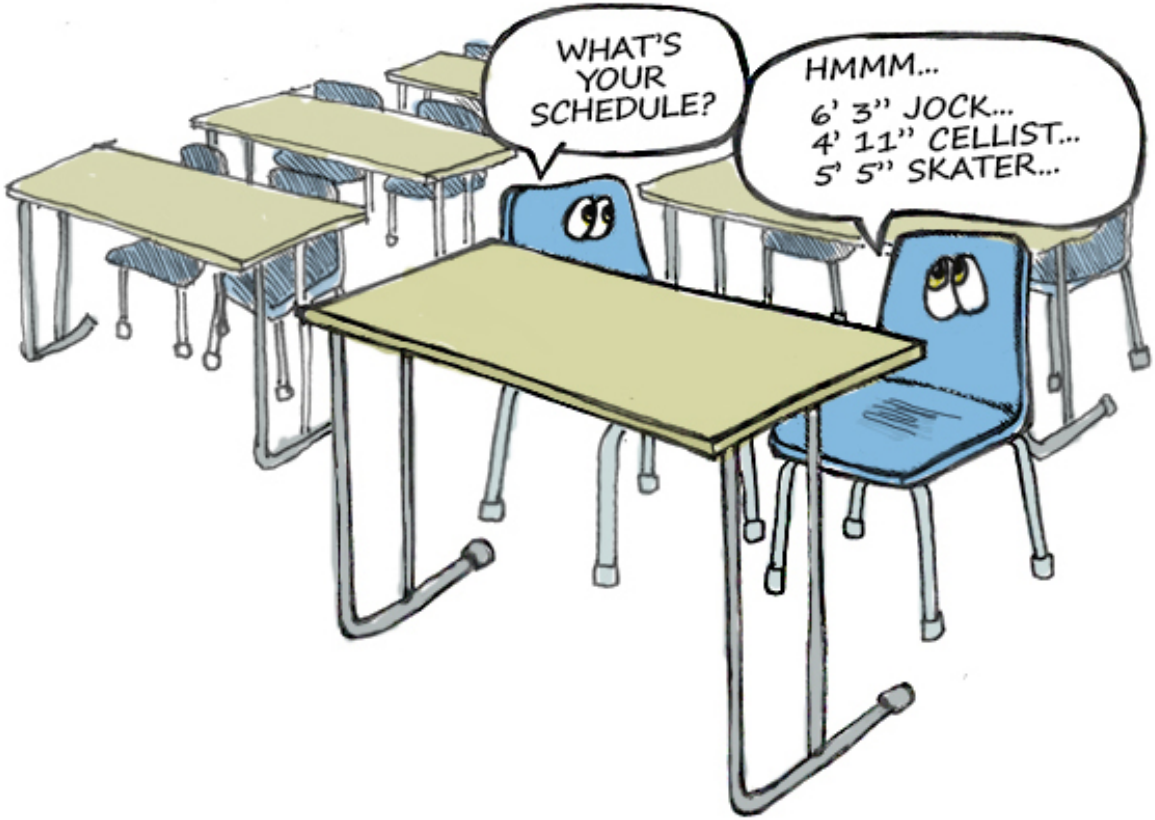
- *Flexichair – changing seat inclination*
- *Rocking mechanism – swivel chair with height adjustment*

<- Flexichair

Rocking Mechanism ->

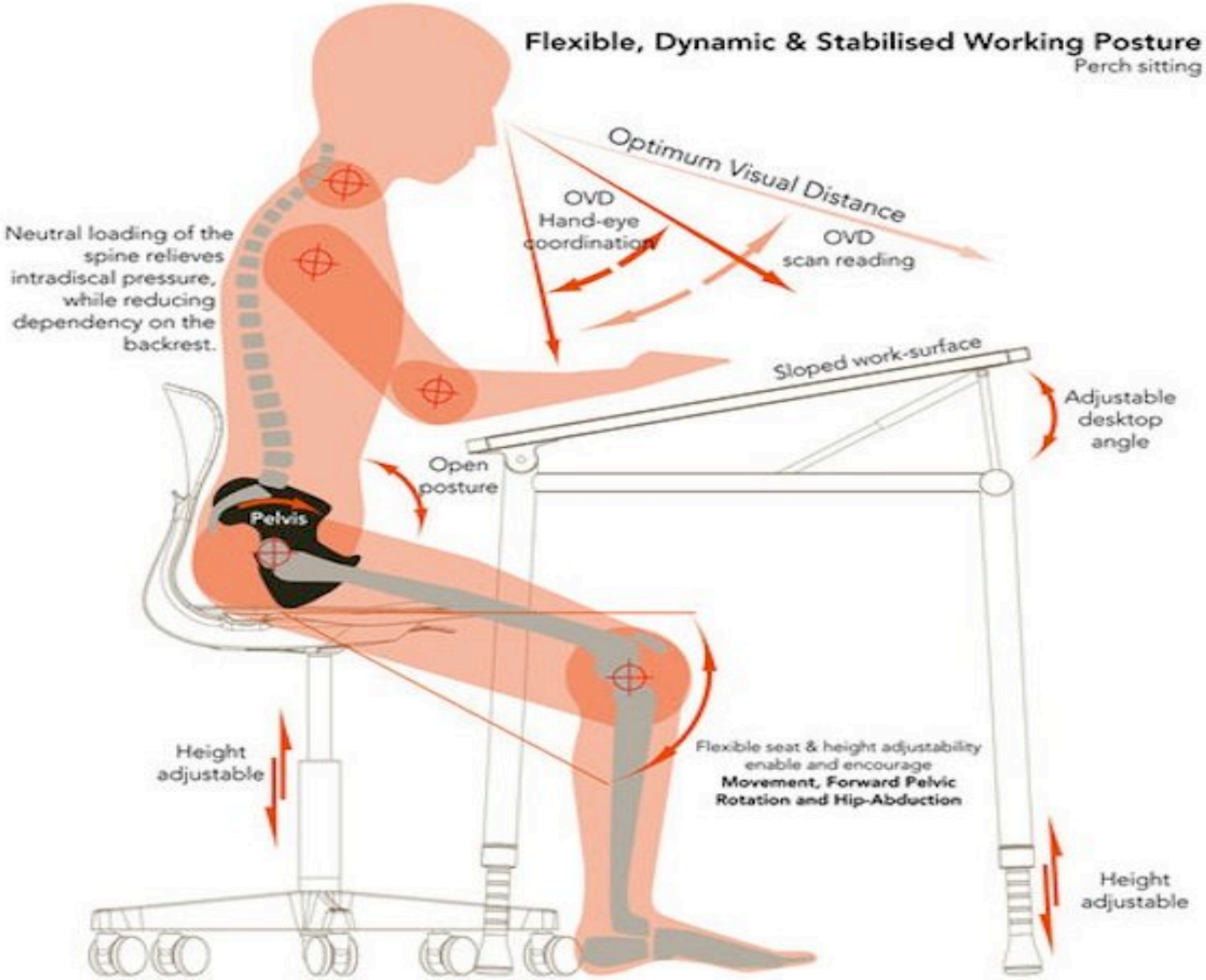
Desks

Horizontal tops causes the child's back to become round and their head to bend forward as they are working



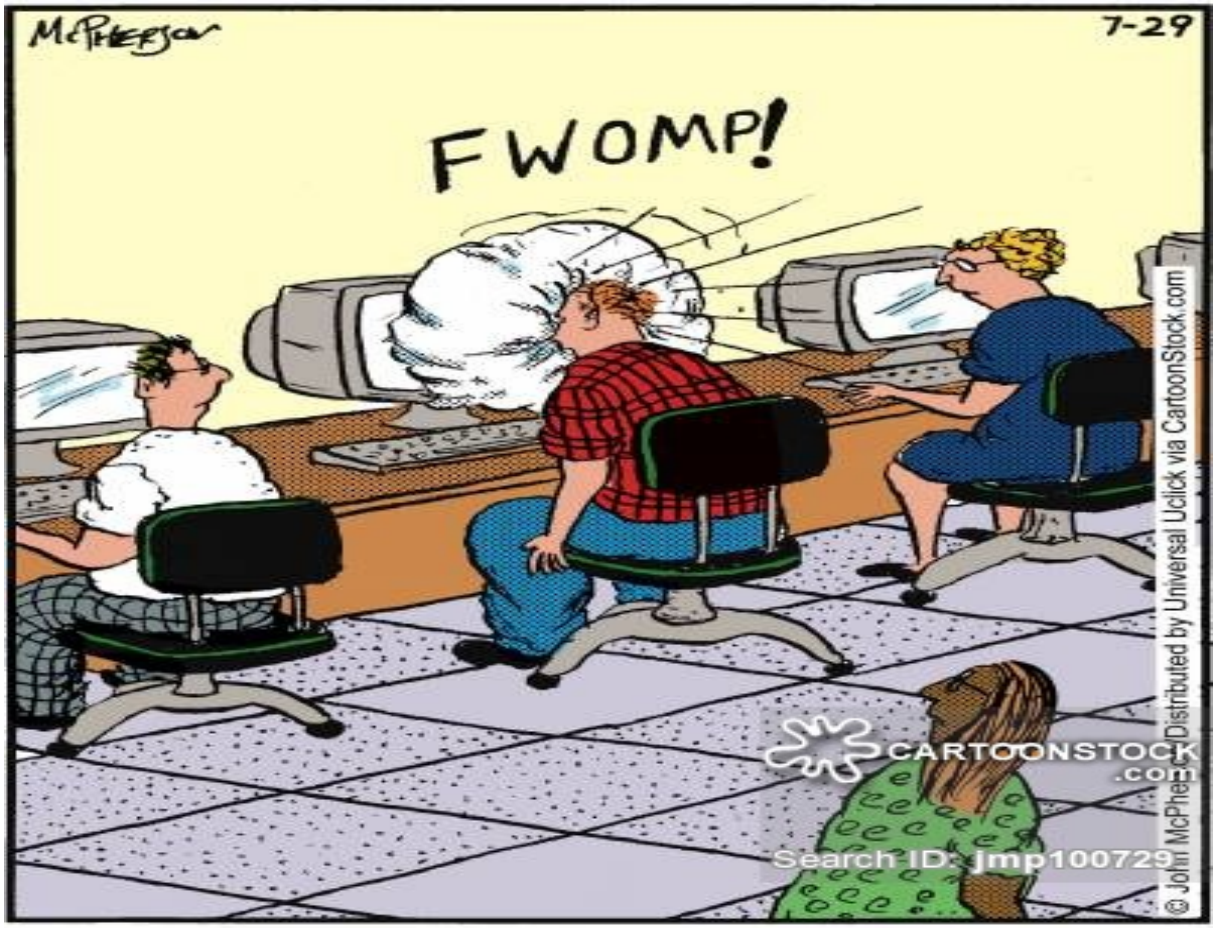
Suggested design:

Inclined top - approximately 16° inclination


Flexible, Dynamic & Stabilised Working Posture
Perch sitting
Optimum Visual Distance
OVD
Hand-eye
coordination
OVD
scan reading
Neutral loading of the spine relieves intradiscal pressure, while reducing dependency on the backrest.
Sloped work-surface
Adjustable desktop angle
Open posture
Pelvis
Height adjustable
Flexible seat & height adjustability enable and encourage
Movement, Forward Pelvic Rotation and Hip-Abduction
Height adjustable

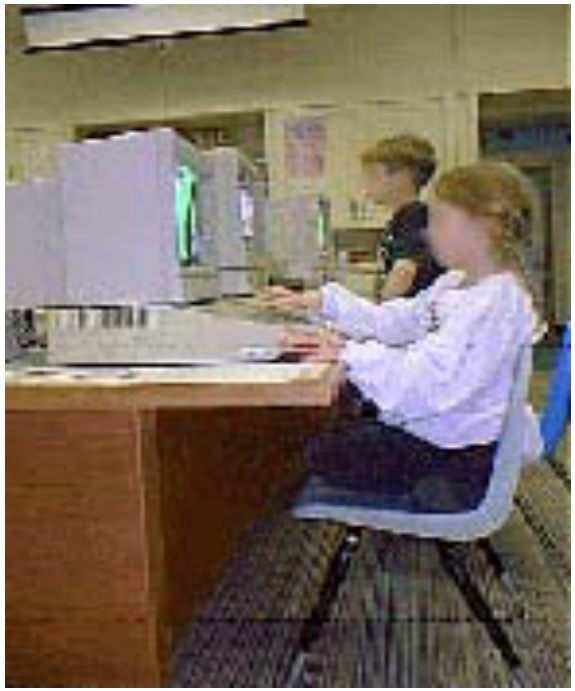
School Ergonomics

COMPUTER



Sensing that he was about to doze off, the air bag on Wade's computer rapidly deployed.

It is a challenge to provide adjustability in elementary classrooms due to the ranging size of the students



First Grader

Fifth Grader

Musculoskeletal discomfort increases with the amount of hours spent on the computer

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Teach children to:

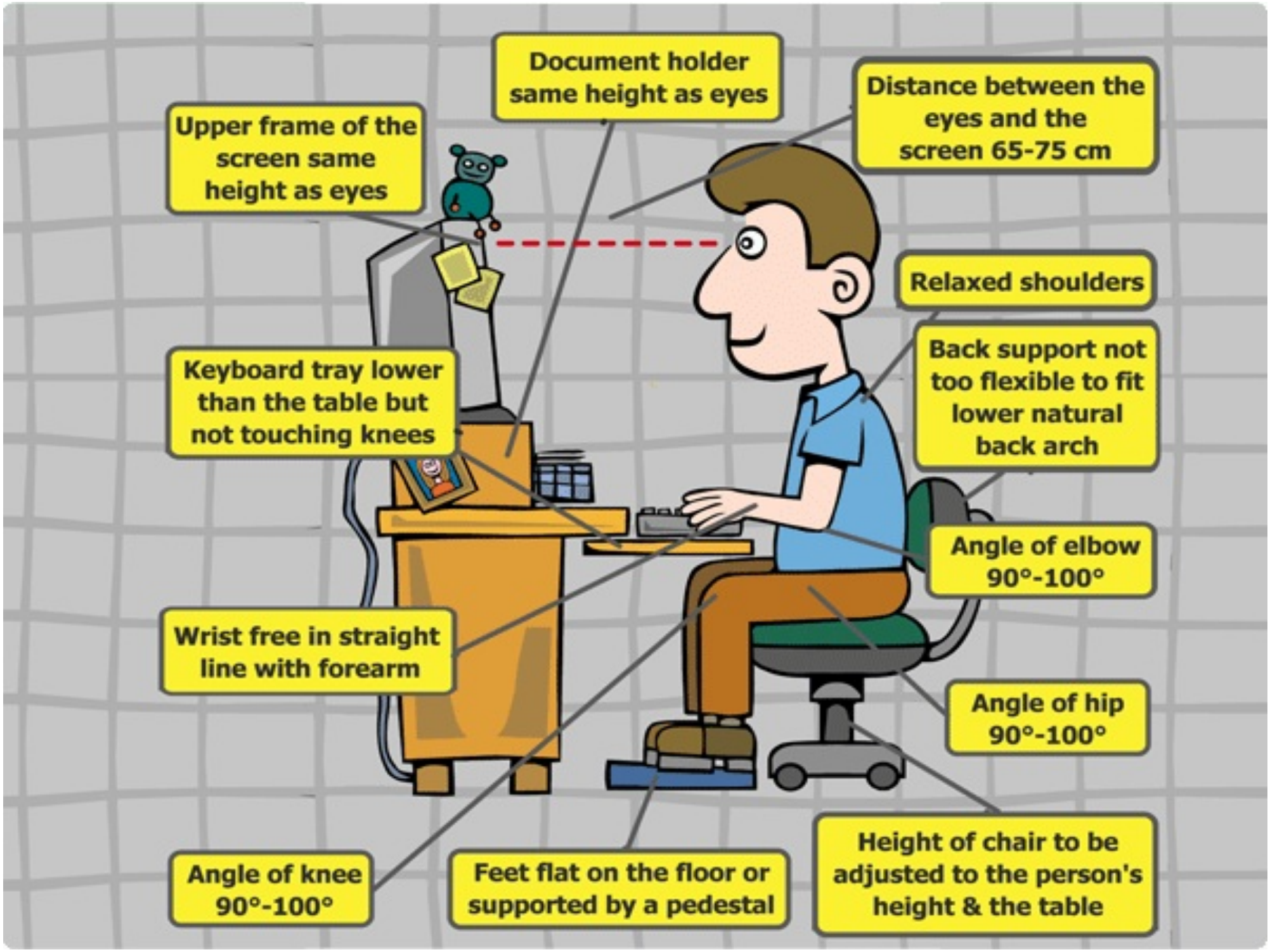
Not sit too close to the monitor

Take frequent rest breaks and “eye breaks”

Stand up, stretch, and wiggle often

Blink frequently

Avoid using the mouse for long periods of time


Document holder same height as eyes
Distance between the eyes and the screen 65-75 cm
Upper frame of the screen same height as eyes
Relaxed shoulders
Back support not too flexible to fit lower natural back arch
Keyboard tray lower than the table but not touching knees
Angle of elbow 90°-100°
Wrist free in straight line with forearm
Angle of hip 90°-100°
Height of chair to be adjusted to the person's height & the table
Angle of knee 90°-100°
Feet flat on the floor or supported by a pedestal

School Ergonomics

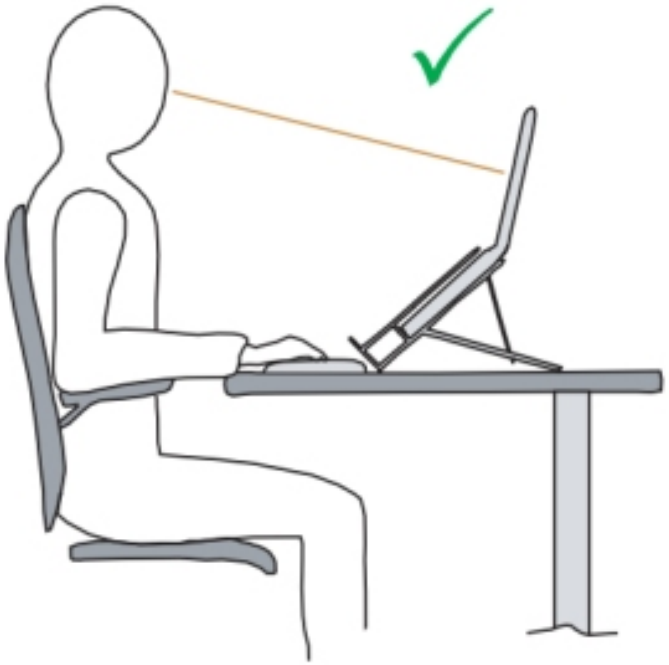
LAPTOPS

The prevalence of laptops is increasing

Ergonomic hazards:

- *Forces the user to lean forward*
- *Laptop display is too low for most users*

To eliminate these hazards, use an adjustable stand or an external keyboard



QUESTIONS

"What are you asking me for? Google it!"

THANKS
FOR TAKING
TIME OUT
I KNOW YOUR
TIME IS VALUABLE
AND I APPRECIATE YOU
SPENDING SOME OF IT WITH ME!