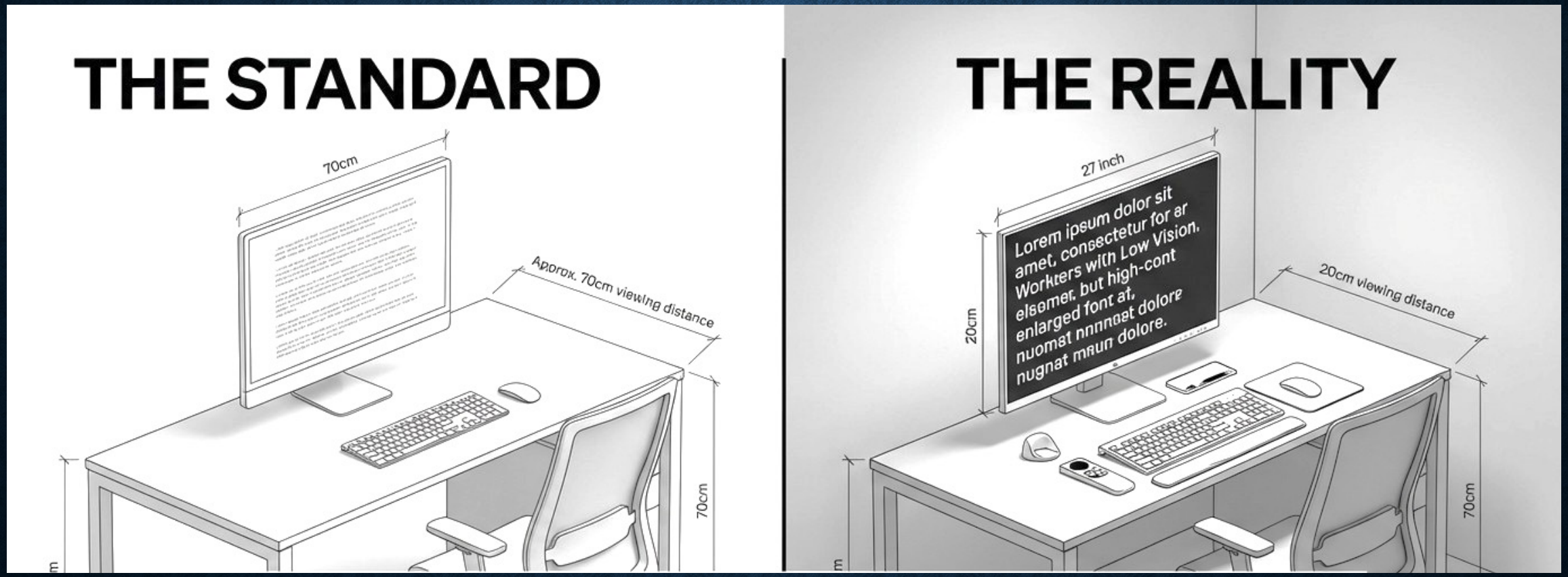
CRAC Rehabilitación Visual Integral
Todos por la inclusión

Optimizing video terminal workstations for individuals with low vision: a case-based approach



Diego Mauricio Leon
Terapeuta Ocupacional
Centro de Rehabilitación para Adultos Ciegos

Juan Manuel Arango Soler
PhD in Public Health
Terapeuta Ocupacional
Universidad Nacional de Colombia

Leidy Rocsana Murillo Malpica
Terapeuta Ocupacional
Centro de Rehabilitación para Adultos Ciegos

DISCLOSURE

- No financial disclosures.
- I work at Centro De Rehabilitación para Adultos Ciegos CRAC.

CRAC Rehabilitación Visual Integral
Todos por la inclusión

Beyond Standards: Tailoring Video Display Terminal (VDT) Workstations for Workers with Low Vision.

Challenging ISO 9241 through Specialized Occupational Therapy Intervention.

While ISO 9241 standards provide general ergonomic guidelines, they often fail to address the specific functional needs of the "Low Vision Triad": **Visual Acuity, Visual Field, and Contrast/Light Sensitivity.**

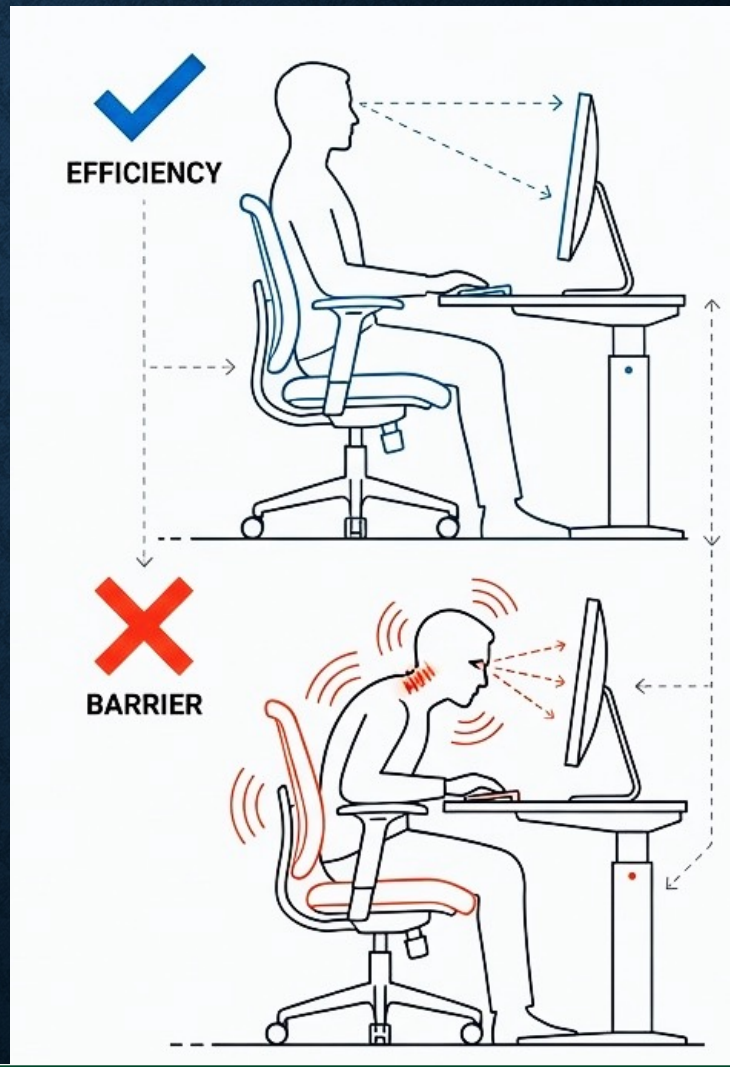
Standardized viewing distances (50–70 cm) are often inaccessible for users with significant visual impairment.

ISO 9241 STANDARD

- **Viewing Distance:** 50–70 cm
- **Polarity:** Positive (Dark on Light)
- **Min Reading Distance:** >400 mm
- **Result:** Ergonomic safety for normative vision.

LOW VISION REALITY

- **Required Distance:** Often <20 cm
- **Polarity Needs:** Negative (Light on Dark)
- **Safety Net becomes:** An Obstacle to Legibility



CRAC Rehabilitación Visual Integral
Todos por la inclusión

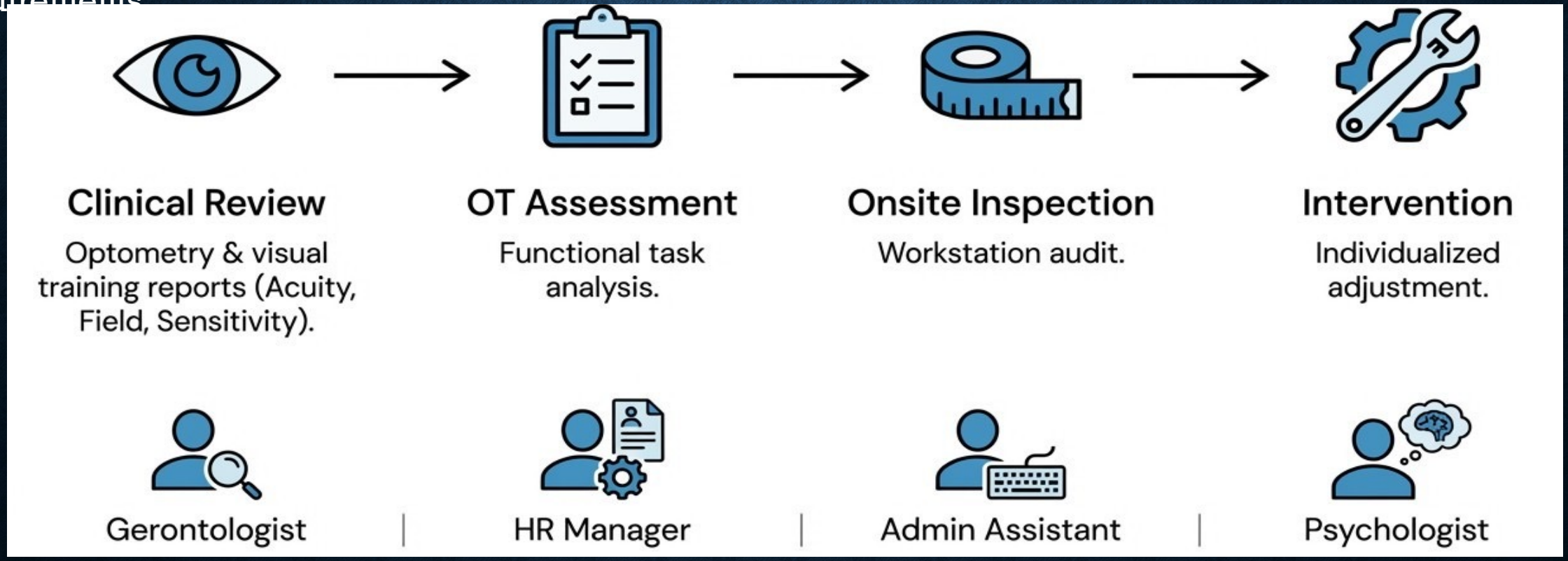
Participants: 4 workers enrolled in specialized Low Vision Optometry and Visual Training programs.

Process:

Review of specialized clinical optometry reports.

In-situ Occupational Therapy workplace assessments.

Analysis of functional variables: Residual vision, glare disability, and task-specific ergonomic requirements.



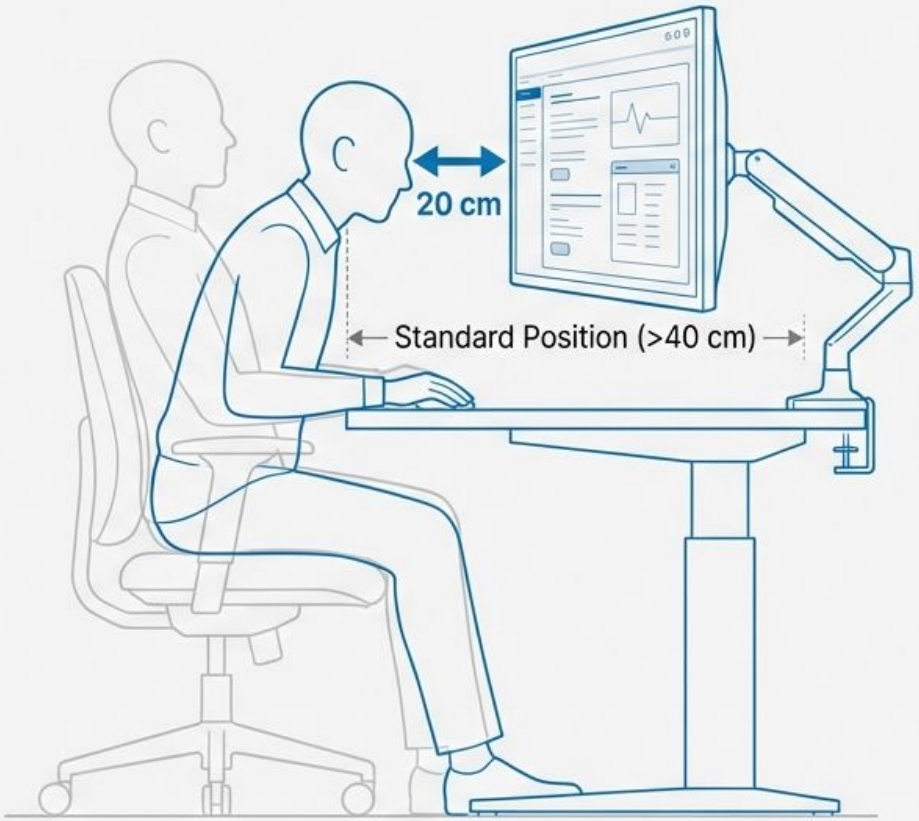
Case Study 1: The Gerontologist

Profile: Glaucoma & Aphakia (post-cataract/retinopexia).

Visual Data:
- **Right Acuity:** 10/5600
- **Left Acuity:** 10/600
- **Deficit:** Severe acuity loss + Field alteration.

The Conflict:
Standard ISO distance (>40cm) made work impossible.

The OT Intervention:
- **Distance:** Reduced to 20 cm.
- **Tech:** Full HD LCD Screen.
- **Outcome:** Functionality restored by violating the ergonomic distance norm.



Adapted Workstation: The Gerontologist's Position

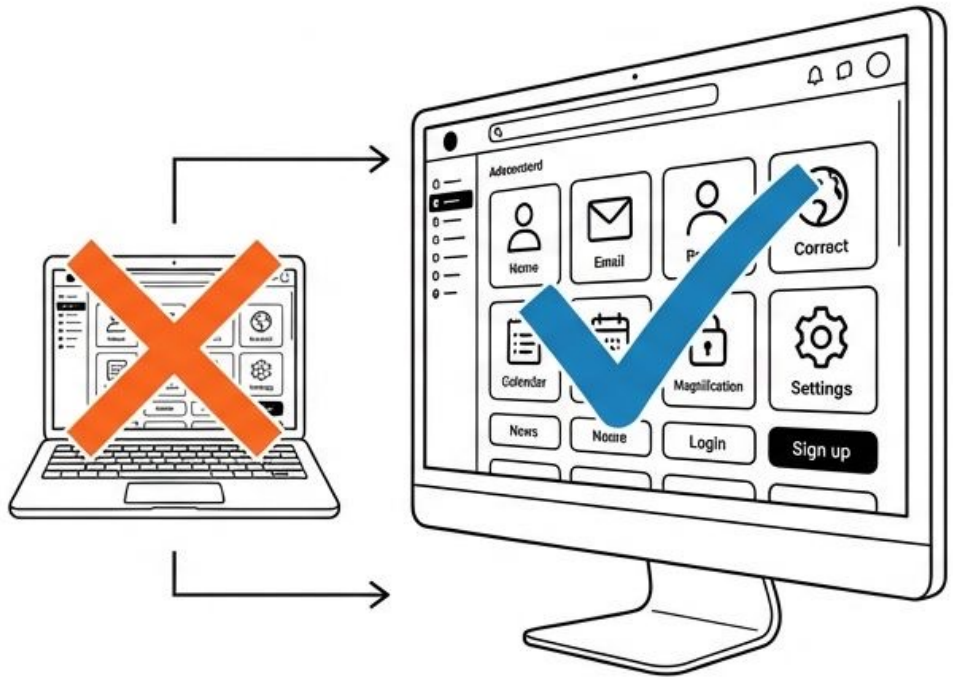
Case Study 2: The HR Manager

Profile: Macular Degeneration & Glaucoma Suspicion.

Visual Data:
- Right Acuity: 20/20
- Left Acuity: 20/80
- Deficit: Central vision loss (Maculopathy).

The OT Intervention:
- Distance: Adjusted to 40 cm (matches acuity).
- Hardware: Screen size ≥ 20 inches.
- Software: Native magnification apps.

Key Takeaway: Laptops (<15 inches) are insufficient. Minimum 20-inch monitors are the functional baseline.



Insufficient Hardware (<15 inches)

Functional Baseline (≥20 inches, Magnified)

Case Study 3: Administrative Assistant

Profile:
Cancer Survivor, Monocular Blindness, Cognitive/Memory issues.

Visual Data:
Right Acuity: 20/70
Left Acuity: No Vision
Deficit: Visual fatigue exacerbated by cognitive load.

The OT Intervention:
Distance: Close range (25 cm).
Strategy: Voice Dictation software.

Outcome:
Balancing sensory load—shifting from visual input to auditory input.

Conceptual Illustration: Shifting Sensory Load to Auditory Input

CRAC Rehabilitación Visual Integral
Todos por la inclusión

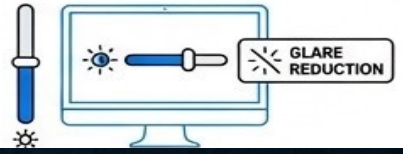
Case Evidence

Clinical Profile	Occupation	Critical Adaptation (Finding)
Advanced Glaucoma / Aphakia	Gerontologist	Required working distance: **20 cm**.
Maculopathy (Toxicity)	HR Management	Light sensitivity management; distance: **40 cm**.
Retinal Disorder / Monocular	Admin Assistant	Reading distance: **25 cm**; cognitive/memory support.
Degenerative Myopia	Psychologist	Monocular vision; working distance: **45 cm**.

CRAC Rehabilitación Visual Integral
Todos por la inclusión

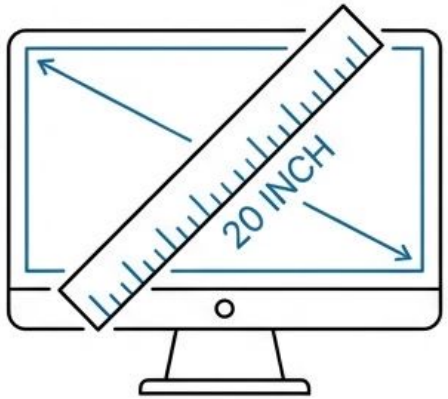
Results: Challenging the ISO Standard

Finding: Necessary adjustments for accessibility and visual fatigue reduction differ significantly from standard technical guidelines.
Hardware Requirements: Mandatory use of high-resolution (Full HD) LCD panels to manage flicker and contrast.
Environmental Tailoring: Success depends on individualized magnification levels, polarity (high contrast), and localized lighting control.

Parameter	ISO 9241 Standard	Low Vision Reality (Findings)
Viewing Distance	50 – 70 cm	20 cm – 45 cm (Dictated by Acuity) 
Screen Size	Standard Formatting	Minimum 20 inches (Full HD) 
Polarity	Positive (Dark on Light)	Negative (Light on Dark) often preferred 
Luminance	Standard Office Levels	Adjustable / Low Glare Mandatory 

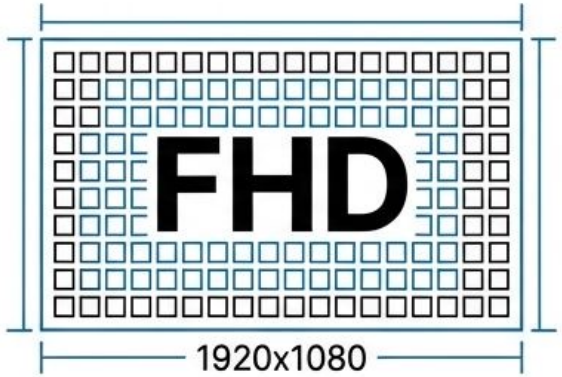
General Guidelines: Hardware & Distance

The Rule of Size



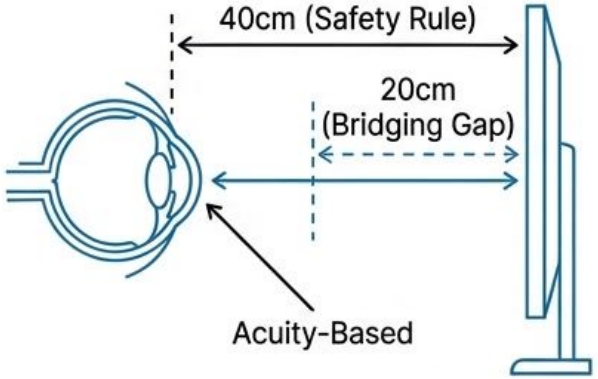
Monitors must be ≥ 20 inches. Laptops alone are insufficient for long-term VDT work.

The Rule of Resolution



Full HD (1920x1080) is the non-negotiable baseline for clarity.

The Rule of Distance



Distance is relative to acuity. Do not enforce the 40cm safety rule. Allow the user to bridge the gap down to 20cm if needed.

*Correction Note: All adjustments apply with prescribed optical correction (microscopes/filters).

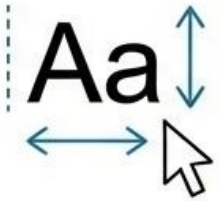
General Guidelines: Software & Environment

Digital Tools

- **Magnification:** Prioritize native OS apps.

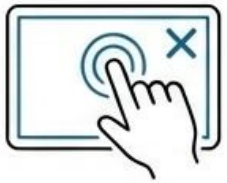
- **Voice Dictation:** Essential for report writing to reduce visual fatigue.

- **ClearType:** Use text optimizers to graduate font size and pointer visibility.



Environment & Skills

- **Touchscreens:** Avoid due to tactile feedback issues and fixed distances.

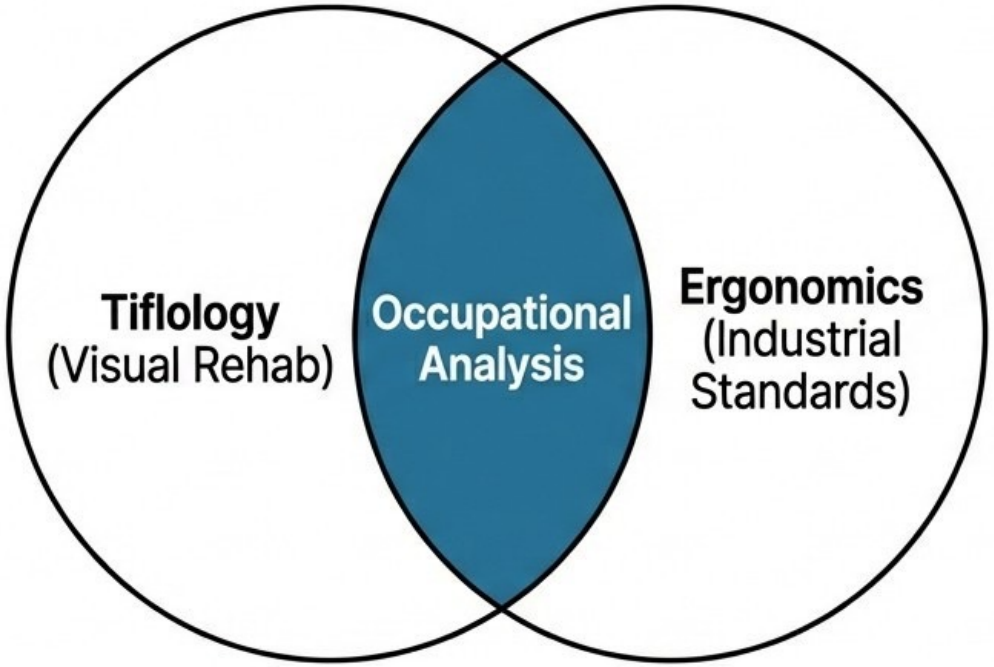


- **Polarity:** Use Dark Mode for glare sensitivity.

- **Rehabilitation:** Training in ‘blind typing’ (mecanografía) is a necessary strategy to reduce eye-on-screen time.

Conclusions for Occupational Therapy

The OT Role: OTs specializing in visual rehabilitation are uniquely qualified to bridge the gap between technical standards and functional autonomy. Core Message: Workplace inclusion for low vision requires "Clinical Ergonomics" rather than "Standard Ergonomics" to ensure effective participation.



Core Competency: The capacity to go beyond the technical norm.

The Mantra: The OT audits the environment, not just the patient. We adjust the workstation to the biological reality, rather than forcing the biology to fit the workstation.

Conclusion

Standardization ≠ Inclusion.

Most necessary adjustments for low vision differ from ISO 9241 recommendations. True accessibility lies in the customization of the environment to the individual's remaining sensory capabilities.

Standardization is the starting point, not the finish line.

CRAC Rehabilitación Visual Integral

Todos por la inclusión

Bibliography

Sede Principal Calle 8 Sur No. 31 A- 31 /Sede Norte Calle 127 B No. 46-39
www.cracolombia.org.