


A young boy is the central figure, wearing a white and black VR headset. He is holding a small globe in his left hand and a stack of three books (two yellow, one black) in his right hand. He has a thoughtful expression, with his hand near his chin. The background is a green chalkboard filled with various mathematical and scientific drawings and formulas, including  $E=mc^2$ ,  $x=2$ ,  $y=6$ ,  $H_2O$ ,  $H_2SO_4$ , and a complex equation  $\lambda = \frac{h \cdot c}{(h \cdot c + e \cdot V \cdot \lambda_2)}$ .

# Recursos Telemáticos para la Educación a Distancia

Francisco Ponte

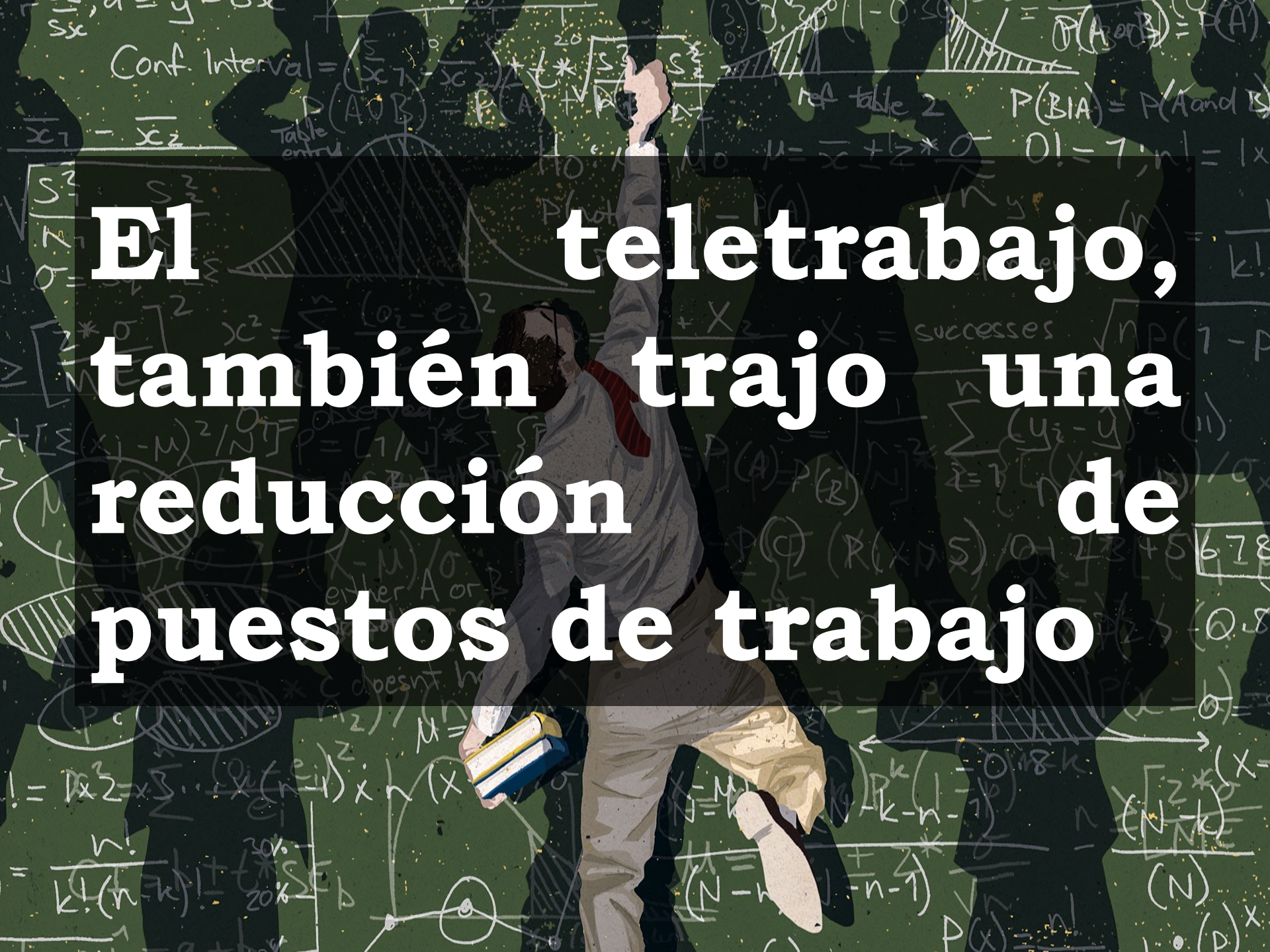


# Nube, IA y Ciberseguridad

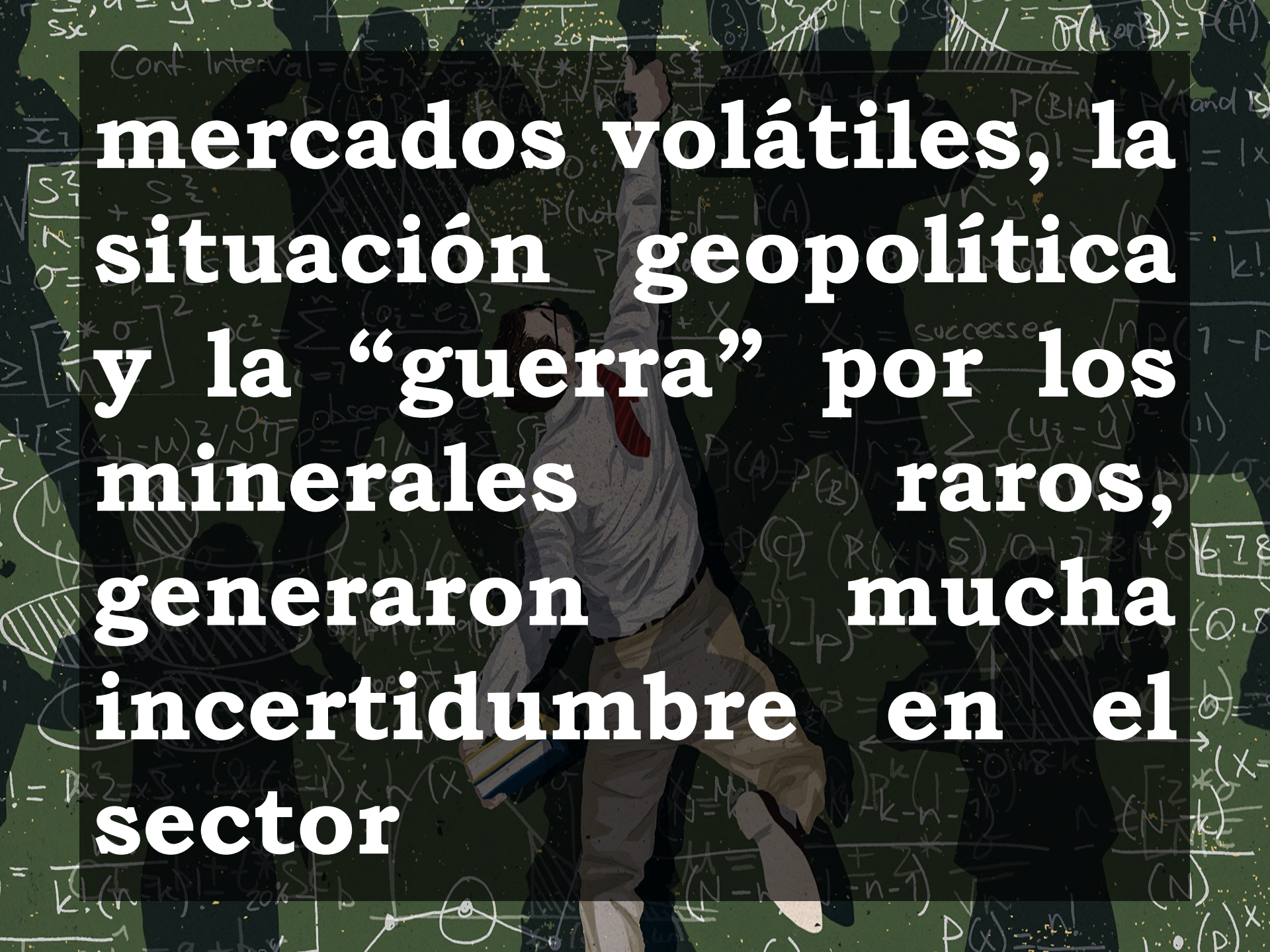
The image features a woman in a professional setting, smiling. Overlaid on the image are several circular icons: a certificate with a ribbon, a laptop with 'E-LEARNING' text, a group of people, a magnifying glass over a document, a graduation cap, a lightbulb, a smartphone with a graduation cap, a play button, a globe with a graduation cap, and a head with gears. A large, stylized clock face is also visible in the background.

A man in a white shirt and tie is running through a dark space filled with mathematical formulas and equations. He is carrying a stack of books under his arm and has his right arm raised. The background is a collage of various mathematical expressions, including probability formulas like  $P(A \cup B) = P(A) + P(B)$ ,  $P(A|B) = P(A \text{ and } B)$ , and  $P(A \cap B) = P(A) \cdot P(B)$ , as well as statistical concepts like "Conf. Interval" and "successes".

**La industria tecnológica  
floreció en el contexto  
de la pandemia, a  
medida que las empresas  
aceleraban sus esfuerzos  
de transformación  
digital**



# El teletrabajo, también trajo una reducción de puestos de trabajo

A man in a white shirt and tie is running on a green background filled with mathematical formulas and diagrams. He is holding a book and has his right arm raised. The background is a collage of mathematical concepts, including probability distributions, confidence intervals, and various equations.

**mercados volátiles, la  
situación geopolítica  
y la “guerra” por los  
minerales raros,  
generaron mucha  
incertidumbre en el  
sector**

**1 BORAX: BORON**  
 Chemical formula:  $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$   
 An alloy of boron, neodymium and iron is used to make the strong permanent magnets used in the speakers, headphones and in the vibration unit of a smartphone. Boron is extracted from borate minerals such as borax and colemanite. Turkey and USA are the largest producers of boron.



**2 PALLADIUM (native)**  
 Chemical formula: Pd  
 Palladium is used in smartphone electrical circuits and contacts. Palladium can be found in its elemental form or alloyed with other platinum group metals (e.g. platinum and iridium) or with iron. Palladium is largely obtained as a by-product of copper and nickel mining. Russia and South Africa currently produce most of the world's palladium.



**3 WOLFRAMITE: TUNGSTEN**  
 Chemical formula:  $(\text{Fe}, \text{Mn})\text{WO}_4$   
 The stability and high melting temperature of tungsten means that it can be used in smartphones for electrical connections and to act as a heat sink to absorb and redistribute excessive heat. Wolframite and scheelite are the most important ore minerals for tungsten. Wolframite is considered to be a conflict mineral due to unethical mining practices in the Democratic Republic of Congo. The top producers of tungsten are China (with more than 80% of the world's production), Vietnam and Russia.



**4 GRAPHITE: CARBON**  
 Chemical formula: C  
 Graphite conducts electricity and is heat resistant. It is used as a negative electrode in smartphone rechargeable batteries. Graphite is a naturally occurring allotrope of carbon which can be found in metamorphic rocks, igneous rocks and in meteorites. China produces almost all of the world's graphite, with smaller quantities coming from India.



**QUARTZ: SILICON**  
 Chemical formula:  $\text{SiO}_2$   
 The processor in a smartphone, the 'brain' that can respond to instructions, is made from thin layers of silicon. A mixture of predominantly silica ( $\text{SiO}_2$ ) with alumina ( $\text{Al}_2\text{O}_3$ ) is also used to manufacture smartphone glass screens. Potassium ions are embedded into the crystalline structure of the glass to strengthen the screen. Silicon is largely sourced from quartzite or quartz sand. China is by far the world's largest producer of silicon, followed by Russia and Norway.

**14 BERYL: BERYLLIUM**  
 Chemical formula:  $\text{Be}_3\text{Al}_2(\text{SiO}_3)_6$   
 Beryllium is used in smartphone electrical contacts and electrical circuit boards. Beryllium is extracted from beryl and bertrandite. The current leading producers are the USA, China and Mozambique.

**15 SPHALERITE: ZINC**  
 Chemical formula:  $(\text{Zn}, \text{Fe})\text{S}$   
 Zinc is used in smartphone circuit boards. When alloyed with aluminium can increase the strength of smartphone cases. Almost 85% of the world's zinc comes from sphalerite ore. Sphalerite is often found as it often contains trace amounts of copper, cadmium and gallium. The current leading producers of zinc are China, Peru and Australia.

**12 CHALCOPYRITE: COPPER**  
 Chemical formula:  $\text{CuFeS}_2$   
 Copper's high electrical and heat conductivity makes it an important mineral for smartphones. The most important ore mineral for copper, but copper is also found in minerals like bornite and chalcocite as well as in the form of native copper. Chile, Peru and China are currently the largest producers of copper.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81
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Elements needed to make an average smartphone

Did you know that your smartphone is a mine of precious metals and rare elements? In fact, the average smartphone uses 75 out of the 81 stable (non-radioactive) elements in the periodic table, 62 of which are metals. All elements in a smartphone, both rare and abundant, come from minerals, usually from metal ores, which must be located, extracted, processed and refined. A small, but growing, proportion of smartphone metals come from metal recycling. With an ever increasing demand for smartphones and concerns over supply security as well as environmental and social issues, innovative technologies are required to source and extract minerals and to use them more efficiently.



**11 TANTALITE: TANTALUM**  
 Chemical formula:  $(\text{Fe}, \text{Mn})\text{Ta}_5\text{O}_{15}$   
 Tantalum is used to manufacture the anodes in smartphone capacitors, the components that store electrical charge. Tantalum is extracted from the minerals tantalite, wodginite and microlite. The current leading producers of tantalum are the Democratic Republic of Congo, Rwanda and Brazil. The mining of tantalum has caused extensive social and environmental problems in the Democratic Republic of Congo and is recognised as a conflict mineral.

**10 SPODUMENE: LITHIUM**  
 Chemical formula:  $\text{LiAl}(\text{SiO}_3)_2$   
 Lithium is used in lithium-ion batteries, the rechargeable batteries found in smartphones and most other electronic devices. Lithium can be extracted from lithium chloride salts found in brine pools. Most of the world's lithium brines come from Chile and Argentina. The minerals spodumene, petalite and lepidolite are also commercially viable sources. Australia is the current leading producer of spodumene.



**8 GOLD (native)**  
 Chemical formula: Au  
 Very small amounts of gold are used in smartphone circuit boards as gold is a very stable element and a conductor of electricity. Gold is usually found in its elemental form in alluvial placer deposits or associated with hydrothermal veins. The current leading producers of gold are China, Australia and the USA.

**7 CASSITERITE: TIN**  
 Chemical formula:  $\text{SnO}_2$   
 Tin is used in solder, the alloy used for soldering different metal components together. It is also used with the element indium to make indium tin oxide, a very thin, transparent, electrically conductive material used to make smartphone touchscreens. The most important source of tin is from the ore mineral cassiterite found in hydrothermal veins and alluvial placer deposits. The current leading producers of tin are China, Indonesia and Myanmar.

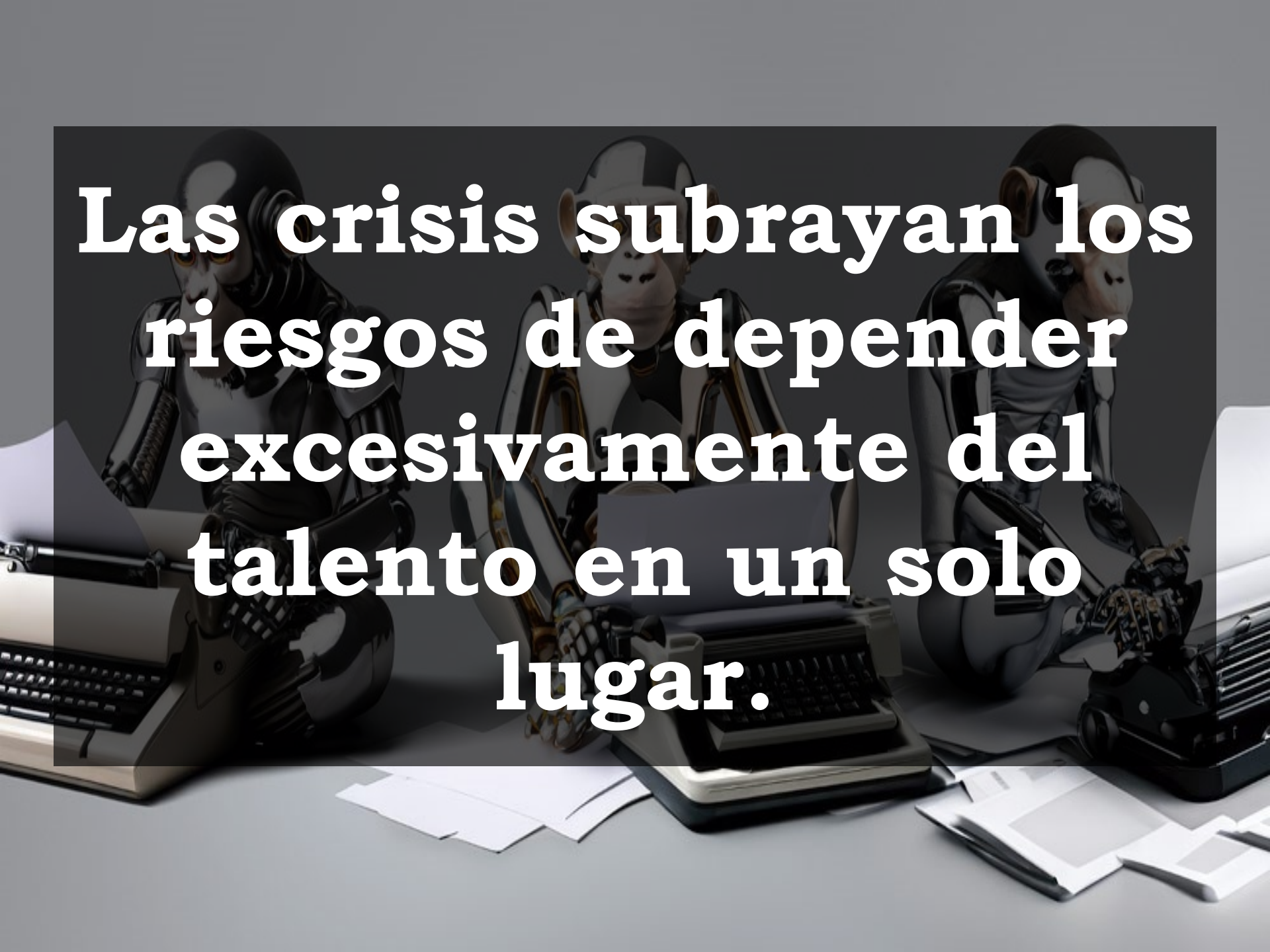
**6 MONAZITE: RARE EARTH ELEMENTS**  
 Chemical formula:  $(\text{Ce}, \text{La}, \text{Nd}, \text{Th})(\text{PO}_4)_3 \cdot \text{SiO}_2$   
 The mineral monazite is extremely important as a source of rare earth elements (REE) - elements from the lanthanide group of the periodic table, including cerium and scandium. REEs are used in small amounts in smartphones for electrical circuitry, vibration units, speakers, camera lenses and to make the various colours in the screen. Monazite, as well as monazite, bastnaesite is another economically important source of REEs. Currently more than 90% of the world's REEs come from China.

# Equilibrio entre la globalización y la autosuficiencia

## MINERALS IN A SMARTPHONE



Mineral production data obtained from Brown, T. et al. World Mineral Production 2012-15. British Geological Survey, Research, Nottingham.

The background image shows three monkey-like robots sitting at desks. Each robot is wearing a headset and is positioned in front of a typewriter. There are several sheets of paper scattered on the desks in front of them. The scene is dimly lit, with a dark, semi-transparent overlay covering the entire image, through which the text is visible.


**Las crisis subrayan los riesgos de depender excesivamente del talento en un solo lugar.**

The image features three monkey-like robots with metallic bodies and monkey heads, each sitting at a desk with a typewriter and scattered papers. The robots are positioned on the left, center, and right. The text 'fuerza laboral en regiones' is overlaid in the center in a large, white, sans-serif font. The background is a plain, light gray surface.

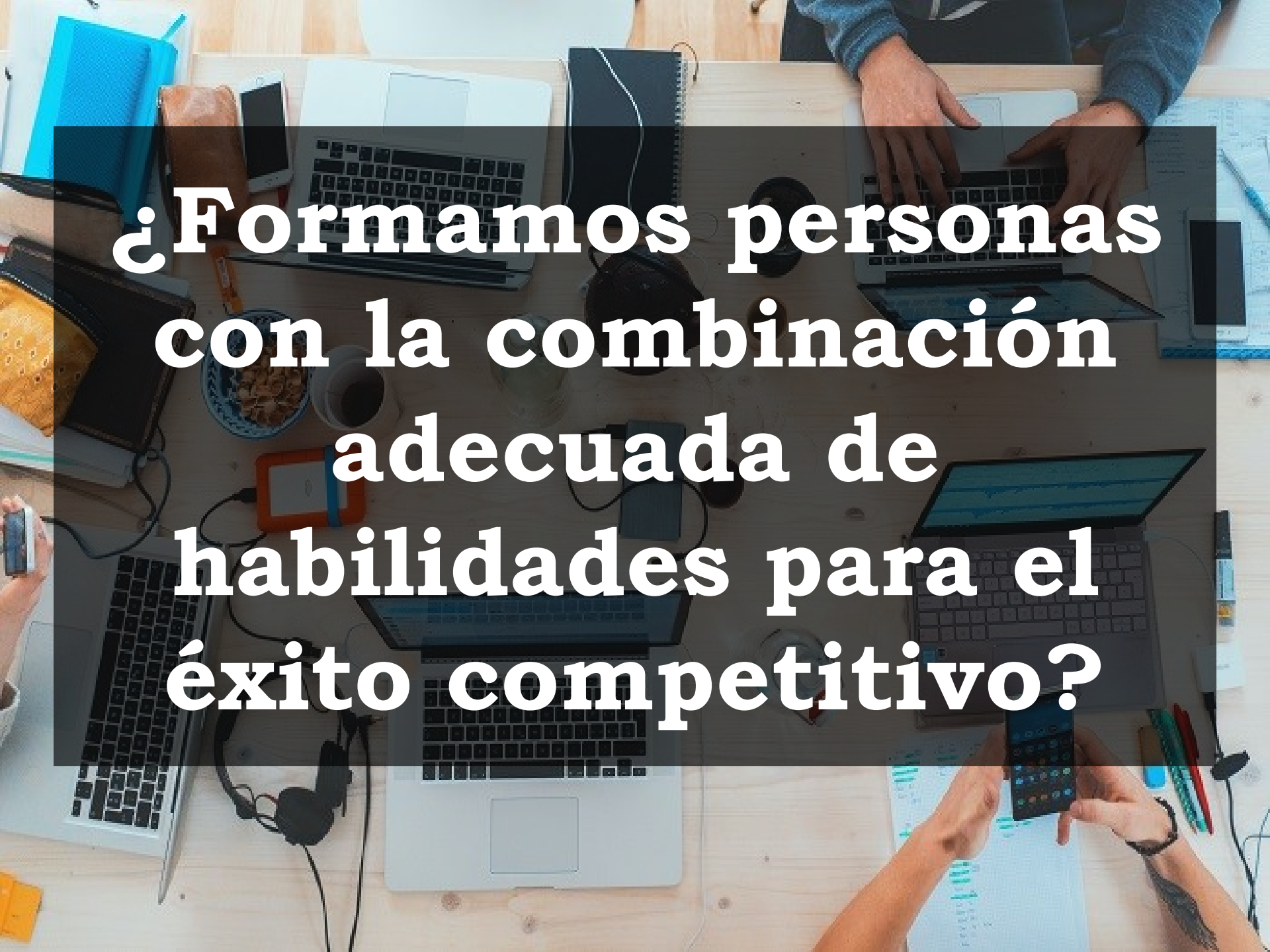
# fuerza laboral en regiones




**Se espera mayor crecimiento en la inteligencia artificial, la computación en la nube y la ciberseguridad**

The background of the image features three cyborg monkeys sitting at desks with typewriters. Each monkey has a metallic, mechanical body with visible gears and joints, while their faces remain human-like. They are positioned as if working in an office environment. The text is overlaid on a semi-transparent dark grey rectangle in the center of the image.

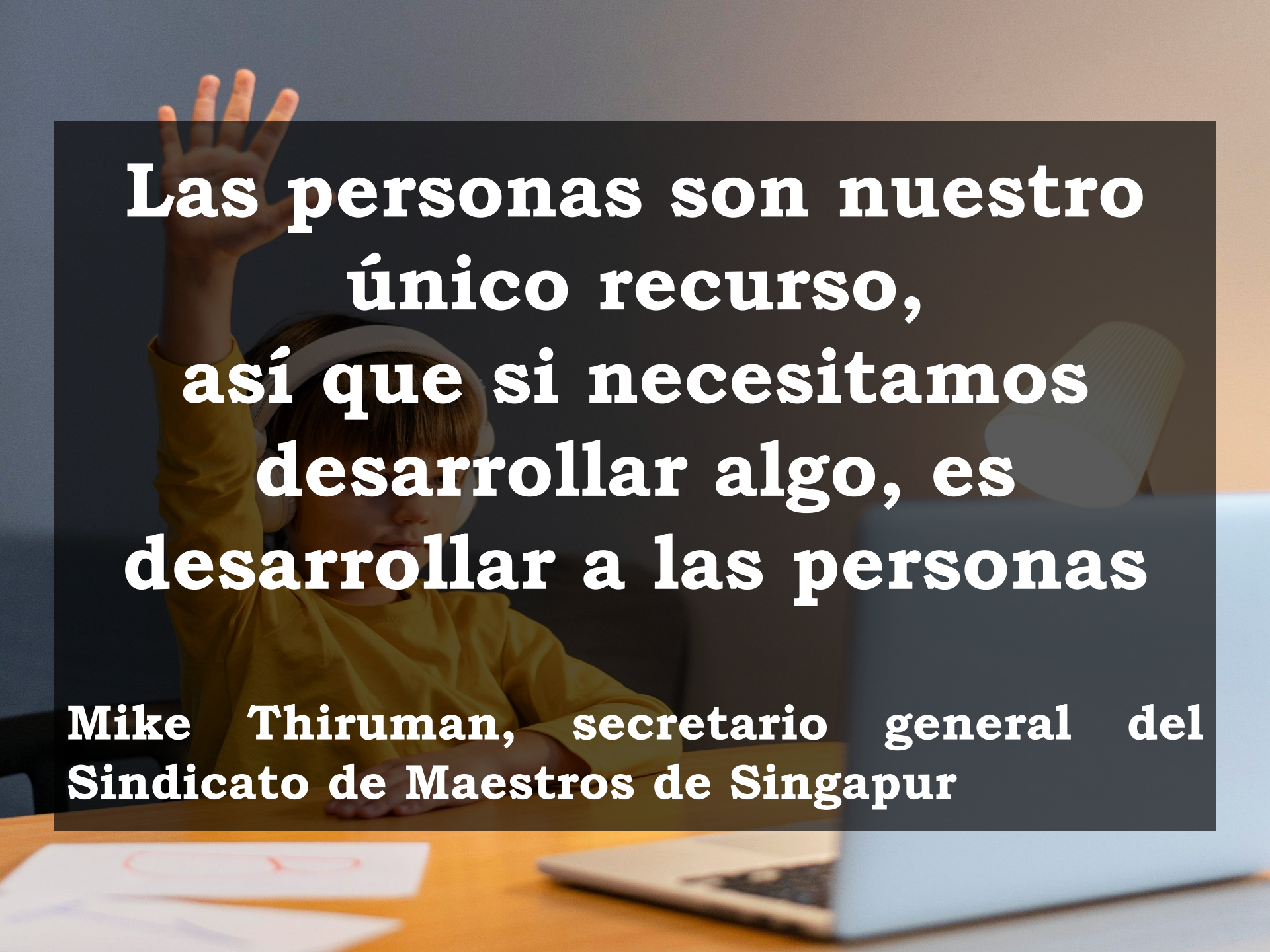
**necesidades de  
capacitación y  
educación  
especializadas**

A top-down view of a busy office desk. Several laptops are open, and people's hands are visible, typing or using devices. There are notebooks, a smartphone, a coffee cup, and various office supplies scattered on the desk. The scene is brightly lit, suggesting a modern, collaborative work environment.

**¿Formamos personas  
con la combinación  
adecuada de  
habilidades para el  
éxito competitivo?**

The background is a vibrant teal color with a pattern of white and light blue geometric shapes, including squares and circles. Overlaid on this are several white, isometric-style illustrations of a classroom. In the center, a teacher in a red shirt stands at a whiteboard, pointing at it. Around the room, several students are seated at desks, each with a laptop and some with wireless signals emanating from them. The overall theme is digital education and technology in schools.

# Muchos especialistas alertan del peligro de la escuela sin papel


A young child with their hand raised in a classroom setting, overlaid with a dark text box. The child is wearing a yellow shirt and has their right hand raised high. The background shows a desk with a laptop and some papers.

**Las personas son nuestro  
único recurso,  
así que si necesitamos  
desarrollar algo, es  
desarrollar a las personas**


**Mike Thiruman, secretario general del  
Sindicato de Maestros de Singapur**



# Sistemas de Gestión de Contenidos y Aprendizaje

An illustration of a person sitting at a desk with a computer monitor, keyboard, and mouse. The person is wearing a yellow shirt and blue pants. Above the person is a large, stylized cloud containing various icons representing business and technology, such as a folder, charts, a play button, a mail envelope, a location pin, a pie chart, and a document. The background is a light blue sky with a few clouds. The text is overlaid on a dark blue semi-transparent rectangle.

**E-Learning está soportado en la combinación de tres factores esenciales: el seguimiento, el contenido y la comunicación**

- 
- **Content Management Systems (CMS)**
  - **Learning Management Systems (LMS) y**
  - **Learning Management Content Systems (LCMS)**

The diagram features a central dark blue circle with the text 'CMS' and 'CONTENT MANAGEMENT SYSTEM' inside. Surrounding this circle are several icons and labels: 'WEBSITE' (a browser window icon), 'ADMINISTRATOR' (a person icon on a monitor), 'OPEN-SOURCE' (a code icon), and 'DOMAIN' (a globe icon). Arrows indicate a clockwise flow from 'OPEN-SOURCE' to 'DOMAIN', then to 'ADMINISTRATOR', then to 'WEBSITE', and finally back to 'OPEN-SOURCE'. Other faint labels include 'NETWORK', 'CONTENT', 'PDF-HTML', and 'DATA'.

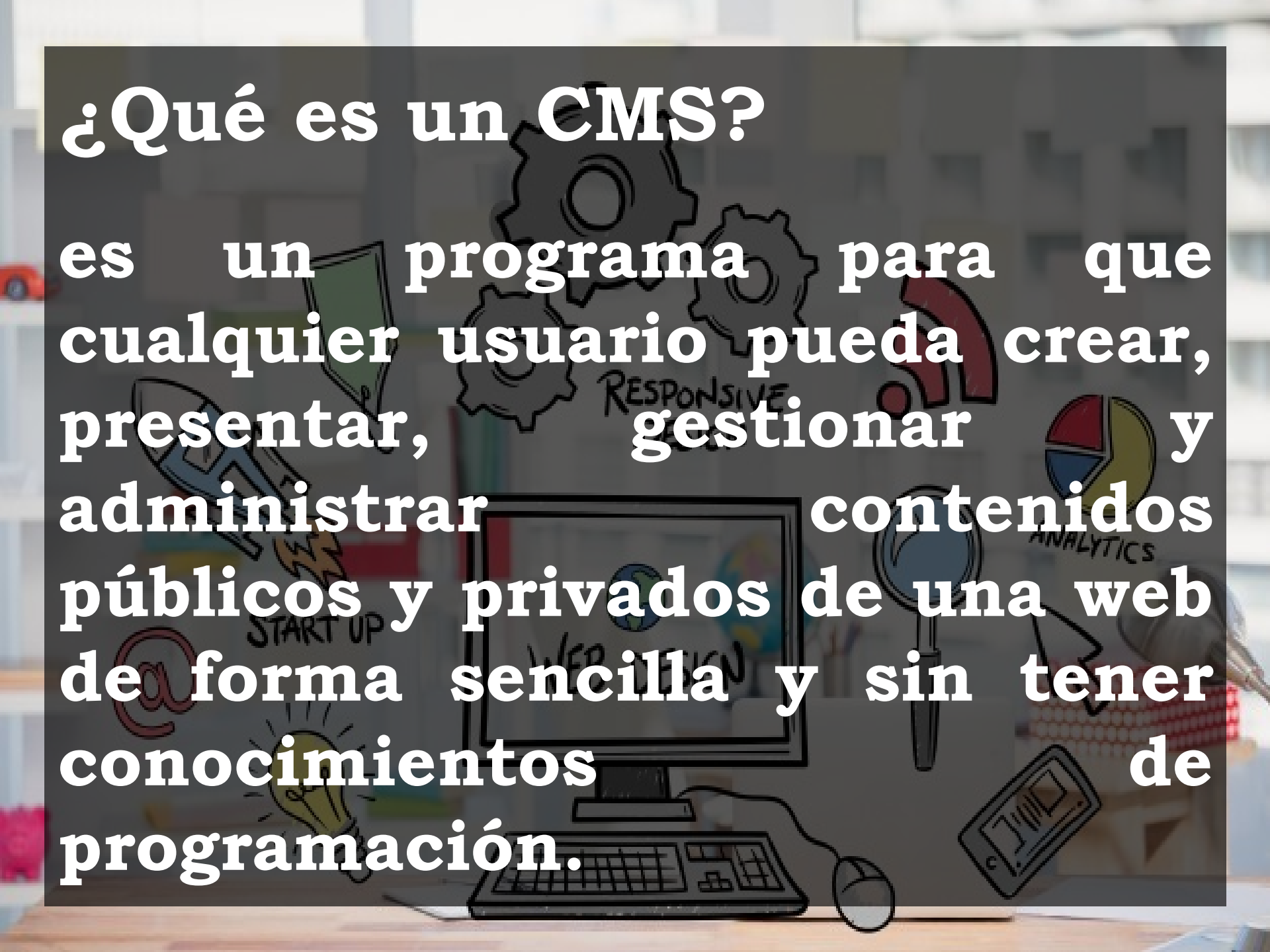
# Sistema de Gestión de Contenidos

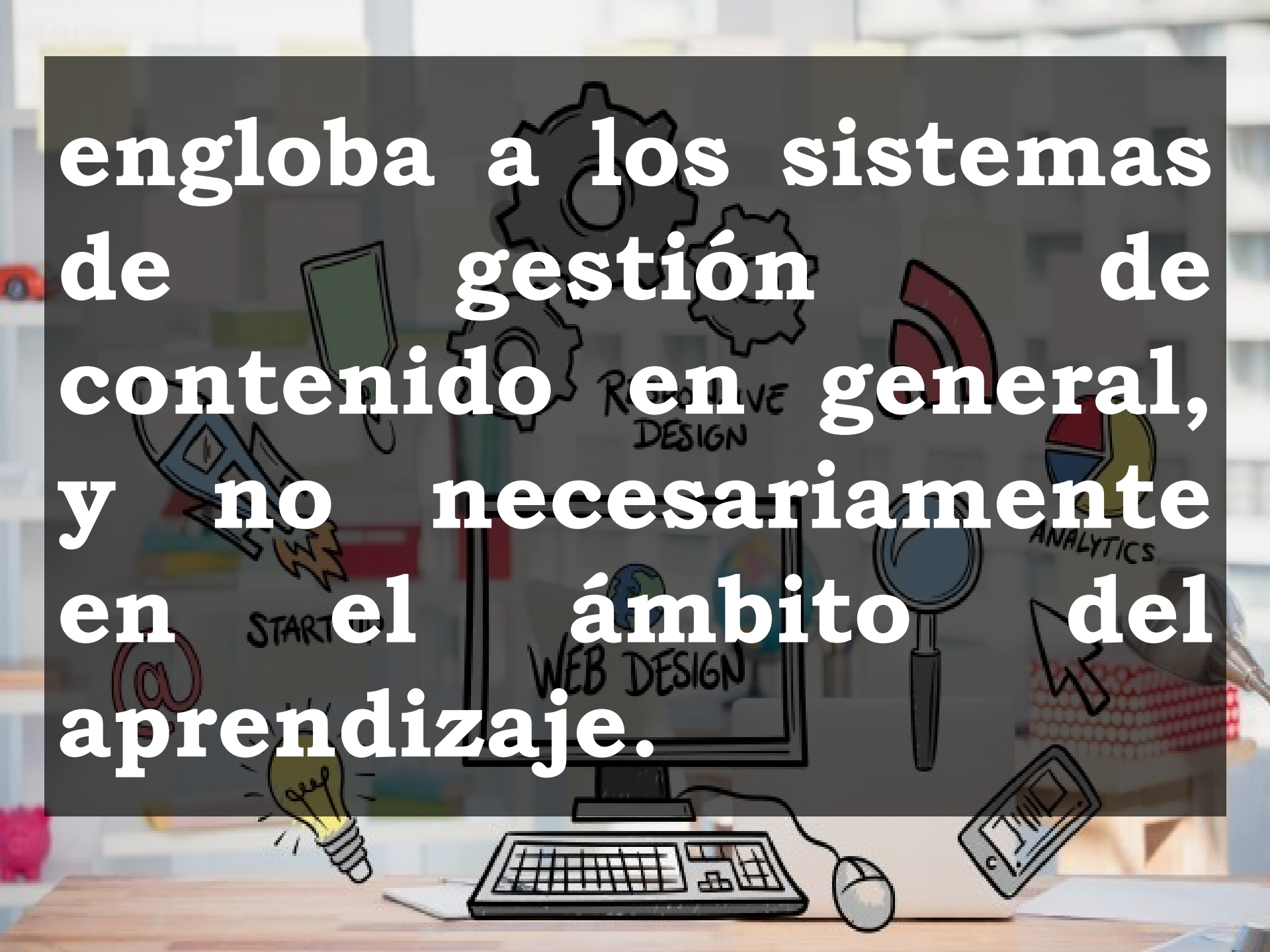
## Content Management Systems

### CMS

# ¿Qué es un CMS?

es un programa para que cualquier usuario pueda crear, presentar, gestionar y administrar contenidos públicos y privados de una web de forma sencilla y sin tener conocimientos de programación.

The background features a dark grey overlay with white text. Behind the text is a collection of hand-drawn icons and terms in a sketchy, artistic style. These include several interlocking gears, a computer monitor displaying a globe, a keyboard, a mouse, a magnifying glass, a pie chart, a lightbulb, a smartphone, and various text labels such as 'RESPONSIVE', 'ANALYTICS', 'START UP', and 'WEB DESIGN'. The overall theme is digital technology and web development.



**engloba a los sistemas de gestión de contenido en general, y no necesariamente en el ámbito del aprendizaje.**



WORDPRESS



WordPress.com



Joomla!®



PrestaShop



Drupal™



Magento®





# Sistema de Gestión de Aprendizajes

## Learning Management Systems

### LMS

Learning Management System

**¿Qué es un LMS?**

**es la infraestructura  
tecnológica a través de  
la cual podemos  
desplegar entornos de  
aprendizaje online.**

# APLICACIÓN

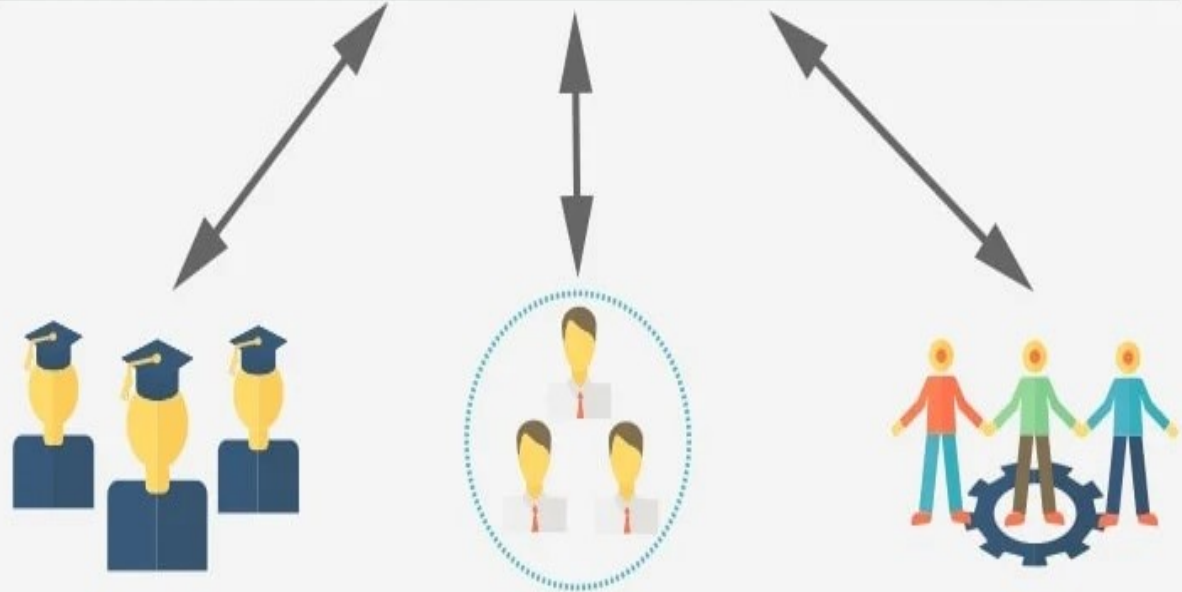
**LMS**  
Learning Management System  
(Sistema de Gestión de Aprendizaje)

**CONTENIDOS** 

**REGISTRO Y EVALUACIÓN** 

**COMUNICACIÓN** 

# USUARIOS



Aprendices



Profesores



Administradores y otros

# Características básicas de las plataformas

## LMS



Acceso de **USUARIOS con diferentes roles** tanto de enseñanza-aprendizaje como de gestión



**DISTRIBUCIÓN** de contenidos de aprendizaje



Herramientas de **GESTIÓN** de cursos o entornos de aprendizaje



**REGISTRO, EVALUACIÓN y SEGUIMIENTO** del aprendizaje de alumnos o trabajadores

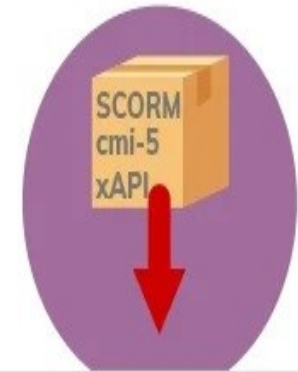
# Otras herramientas importantes en los LMS



Herramientas de  
**COMUNICACIÓN E INTERACCIÓN**



Herramientas de  
**CREACIÓN DE CONTENIDOS**



Importación de formatos  
**ESTÁNDAR DE APRENDIZAJE**

# tipos de LMS



## Corporativos

- De estructura más flexible aunque más enfocada al aprendizaje sin profesor/instructor.
- El cumplimiento de estándares (SCORM, cmi5, etc.) e integraciones con otros sistemas es más importante
- Es mucho más relevante el aprendizaje social e informal (relacionado con LXP)



## Académicos

- Más orientado hacia el aprendizaje en grupos definidos y sincrónicos.
- Las herramientas de colaboración son importantes.
- El papel del tutor o profesor es más relevante.
- Calendarios, hojas de calificaciones y sistemas de clases virtuales son algunas herramientas imprescindibles.

Aprendizaje en



# tipos de LMS



## Open-source (código libre)



## Comerciales de código privado



## Alojado (controlamos la gestión del hosting)

- No hay costes de licencia.
- Código actualizado por una comunidad con intereses diversos.
- Podemos modificar el código para añadir funcionalidades.
- Somos responsables de instalar, alojar, administrar y mantener el LMS en nuestros servidores (costes de infraestructura).

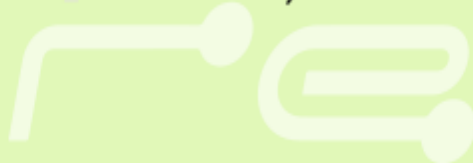
- Coste de licencia alto.
- El código es actualizado por la empresa en función de las necesidades de sus clientes.



## SaaS

(software como servicio)

- Son la mayoría de los LMS.
- Infraestructura de servidores de la misma empresa que nos proporciona el LMS.
- Pago periódico en función del uso (bajo coste inicial, reducción según volumen, etc.)
- Las actualizaciones y el mantenimiento está centralizado por la empresa proveedora.



## SOFTWARE CÓDIGO ABIERTO

moodle

Chamilo  
E-Learning & Collaboration Software

Sakai

claroline  
connect  
EASY & FLEXIBLE LEARNING SOLUTIONS

Dokeos

## SOFTWARE COMERCIAL

Bb  
Blackboard

Skillsft

catedra  
LMS

SABA

educativa

## ONLINE

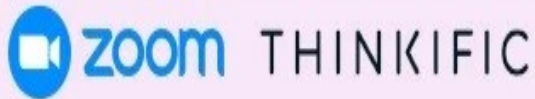
edmodo

Google Classroom™

WizIQ

Udemy

schoolology®



Sistemas de clases virtuales

Plataformas de marketing de cursos

Aplicaciones de colaboración y comunicación

Herramientas de autor

Aplicaciones educativas



***¡No las confundas con un LMS!***

LMS?





# **Sistema de Gestión de Contenidos de Aprendizajes**

## **Learning Content Management Systems LCMS**

**Learning Content Management System**



# ¿Qué es un LCMS?

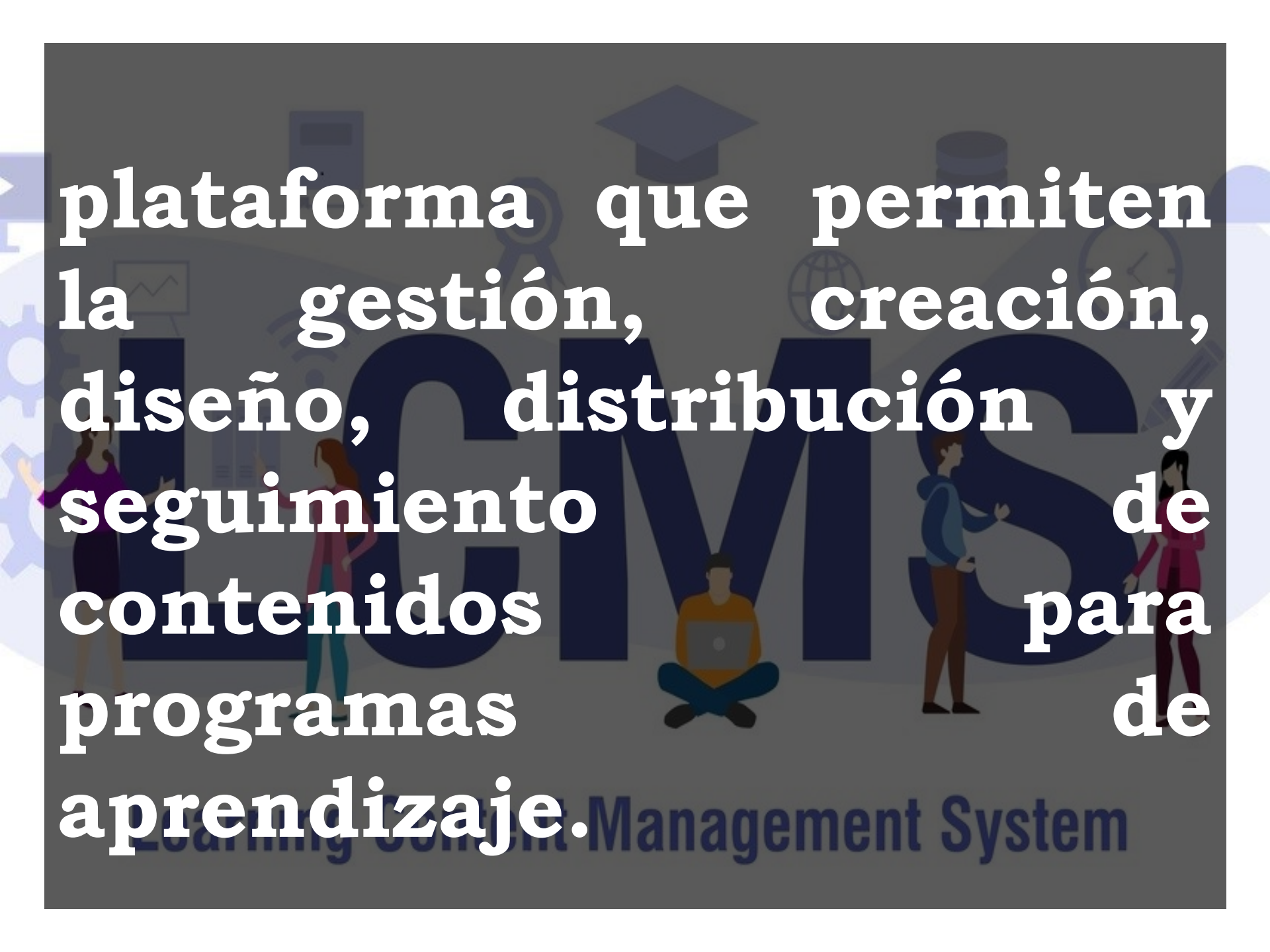
plataforma para gestión,  
creación, distribución y  
seguimiento de contenidos  
para programas de  
aprendizaje.

Learning Content Management System

**plataforma pensada  
para crear contenido  
(como un CMS) a fin  
de facilitar el  
aprendizaje (como  
un LMS).**

Learning Content Management System





**plataforma que permiten  
la gestión, creación,  
diseño, distribución y  
seguimiento de  
contenidos para  
programas de  
aprendizaje.**

**LMS**  
Learning Content Management System

- 
- **iSpring Learn**
  - **Blackboard**
  - **eDucativa**
  - **Canvas**
  - **Moodle**

**Learning Content Management System**

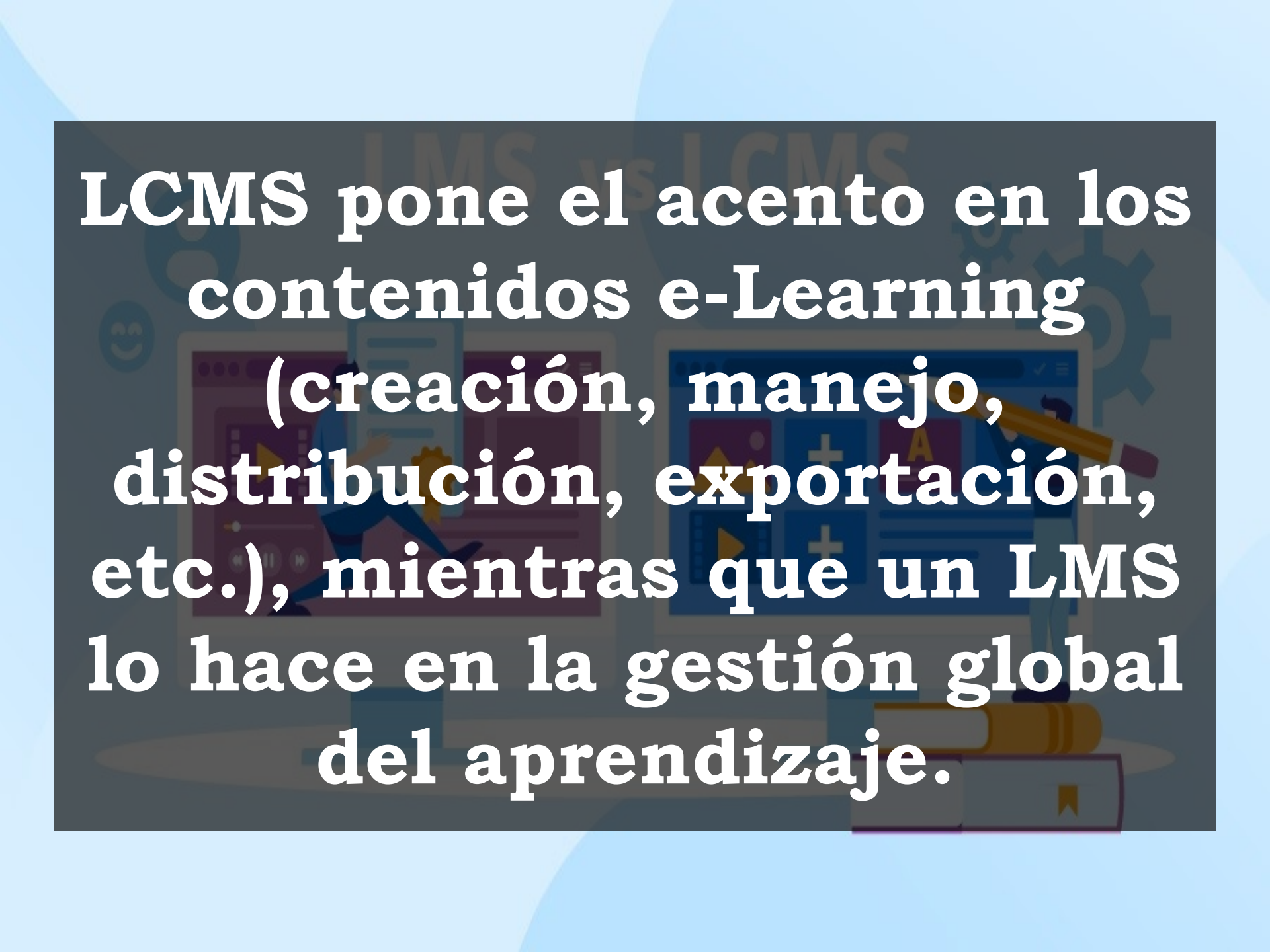
# LMS vs LCMS

**¿Cuál es la  
diferencia entonces  
entre LMS y LCMS?**



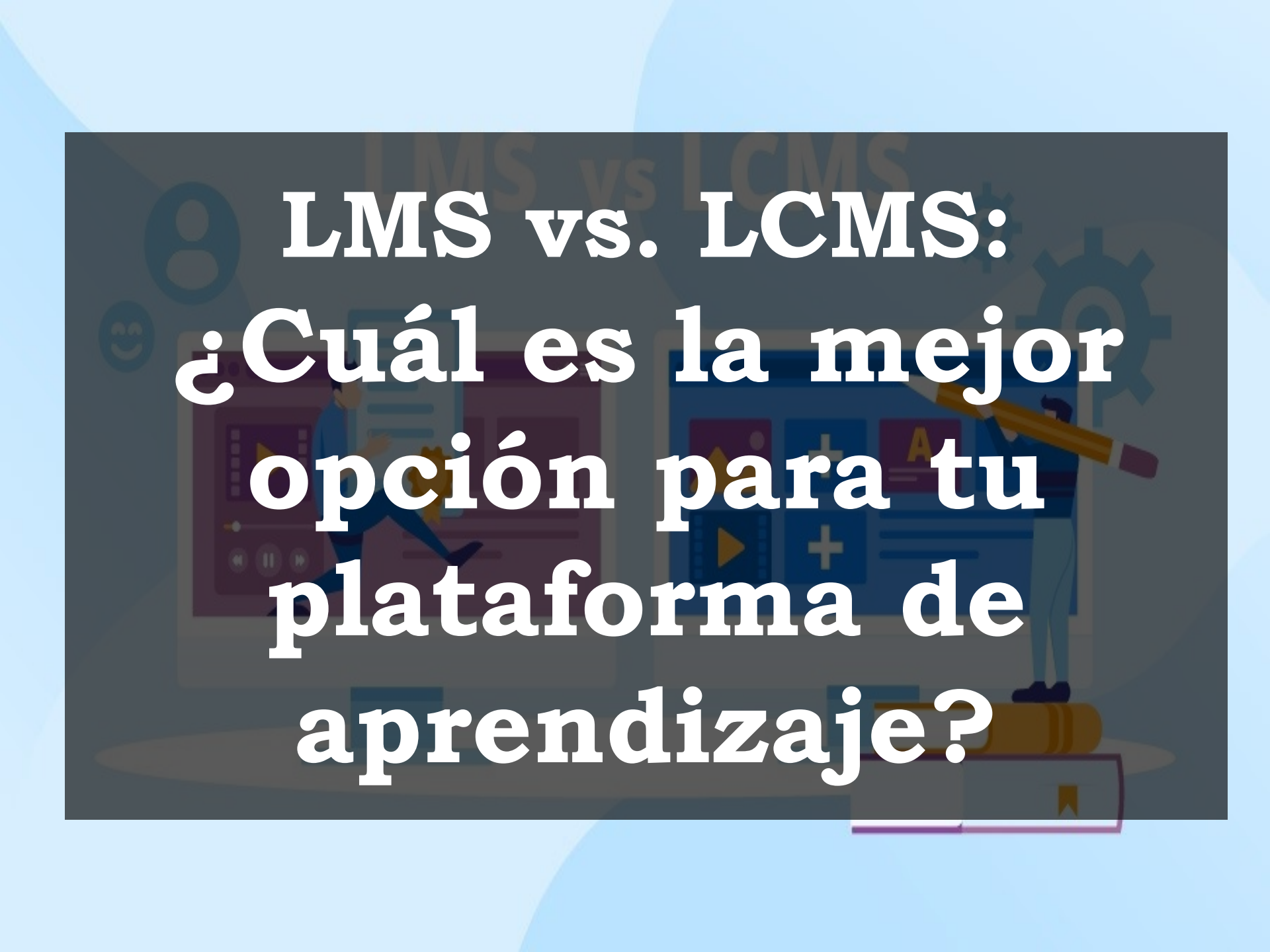
**Los LMS permiten extraer datos de la formación (resultados de evaluación, participación, etc.) y gestionar todo el proceso formativo, mientras que los LCMS permiten la creación y alojamiento de los contenidos pedagógicos.**

**LCMS pone el acento en los contenidos e-Learning (creación, manejo, distribución, exportación, etc.), mientras que un LMS lo hace en la gestión global del aprendizaje.**



**LCMS se especializa en contenido de aprendizaje digital, mientras que un LMS permite a los usuarios administrar experiencias de aprendizaje, incluidas formas tradicionales de aprendizaje y capacitación**


**LMS vs. LCMS:**  
**¿Cuál es la mejor  
opción para tu  
plataforma de  
aprendizaje?**

The background features a stylized illustration of a classroom. On the left, a teacher in a blue suit is walking. In the center, a student is sitting at a desk. On the right, another student is standing and holding a large yellow pencil. The scene is filled with educational icons like gears, a smiley face, and a play button. The text is overlaid on a dark grey rectangular area.

# 4 DIMENSIONES

Para establecer criterios en la selección de plataformas LMS





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**[@kiconet](#)**

