



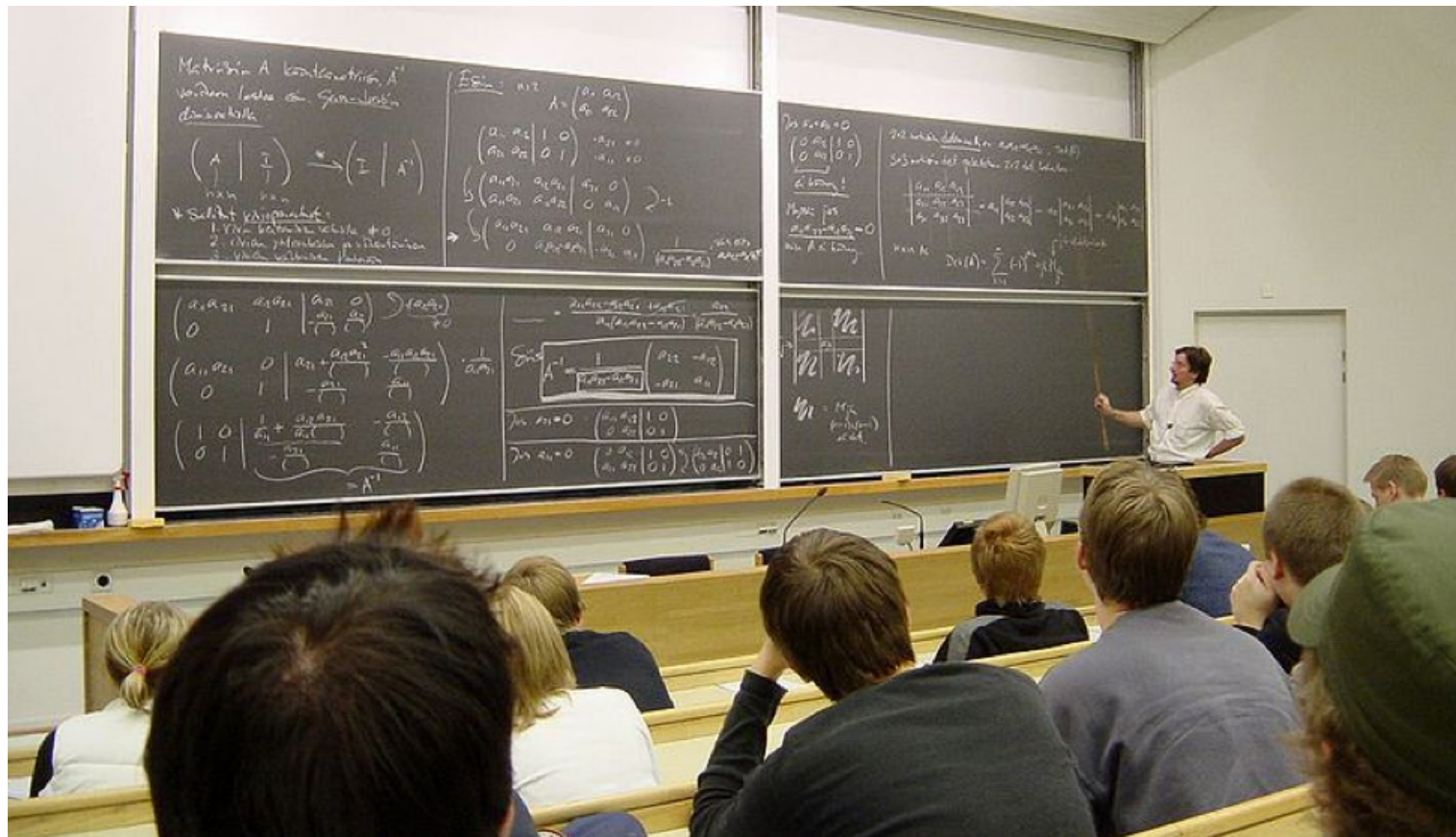
UNIVERSIDAD
DE MÁLAGA

La ciencia y la tecnología del *“eLearning”*

Ricardo Conejo Muñoz



¿Qué entendemos por eLearning?



¿Qué entendemos por *eLearning*?

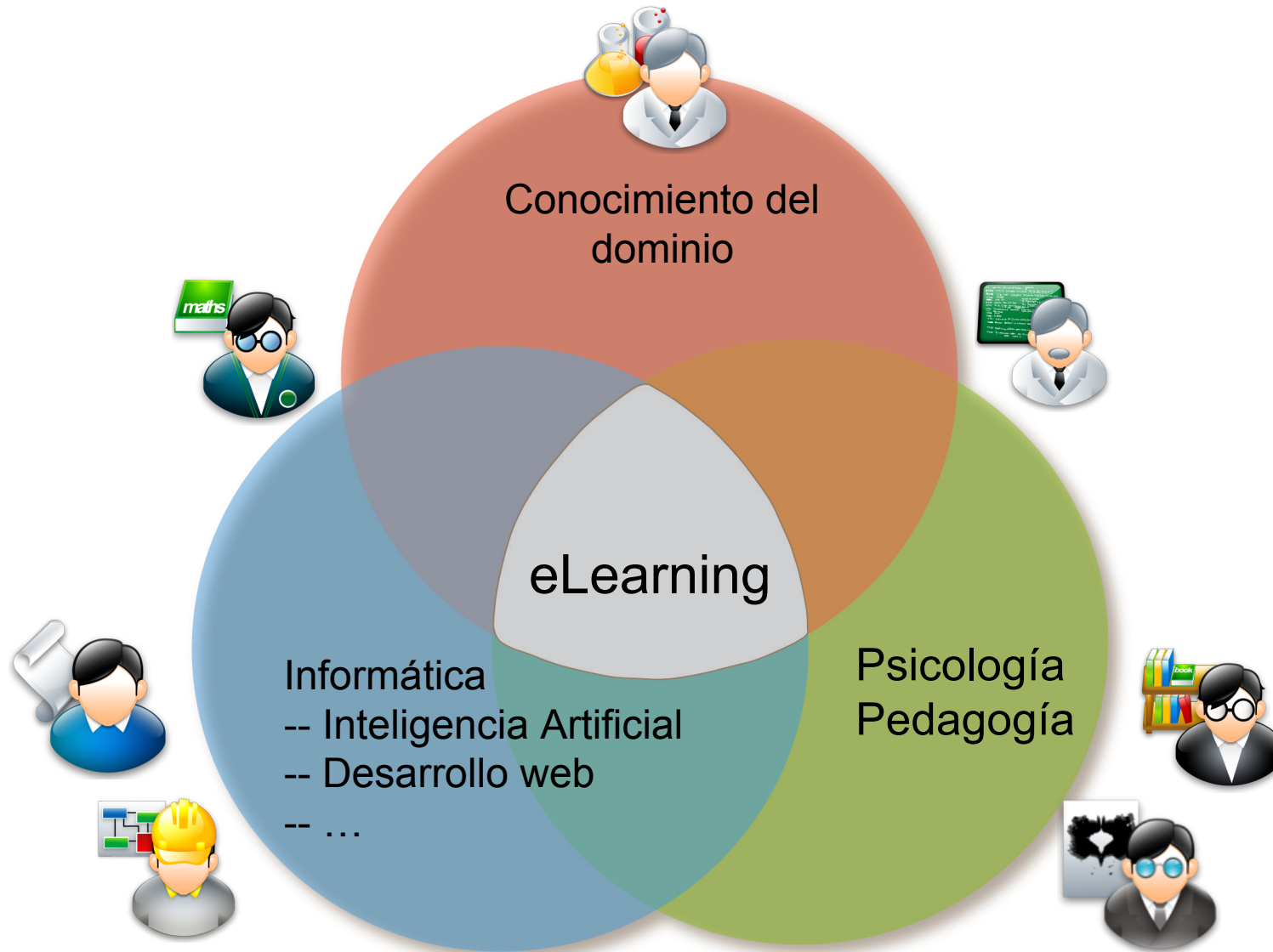
- Soporte del proceso de aprendizaje mediante nuevas tecnologías.
 - Aprendizaje a distancia.
 - Aprendizaje autónomo.
 - Aprendizaje en grupo.



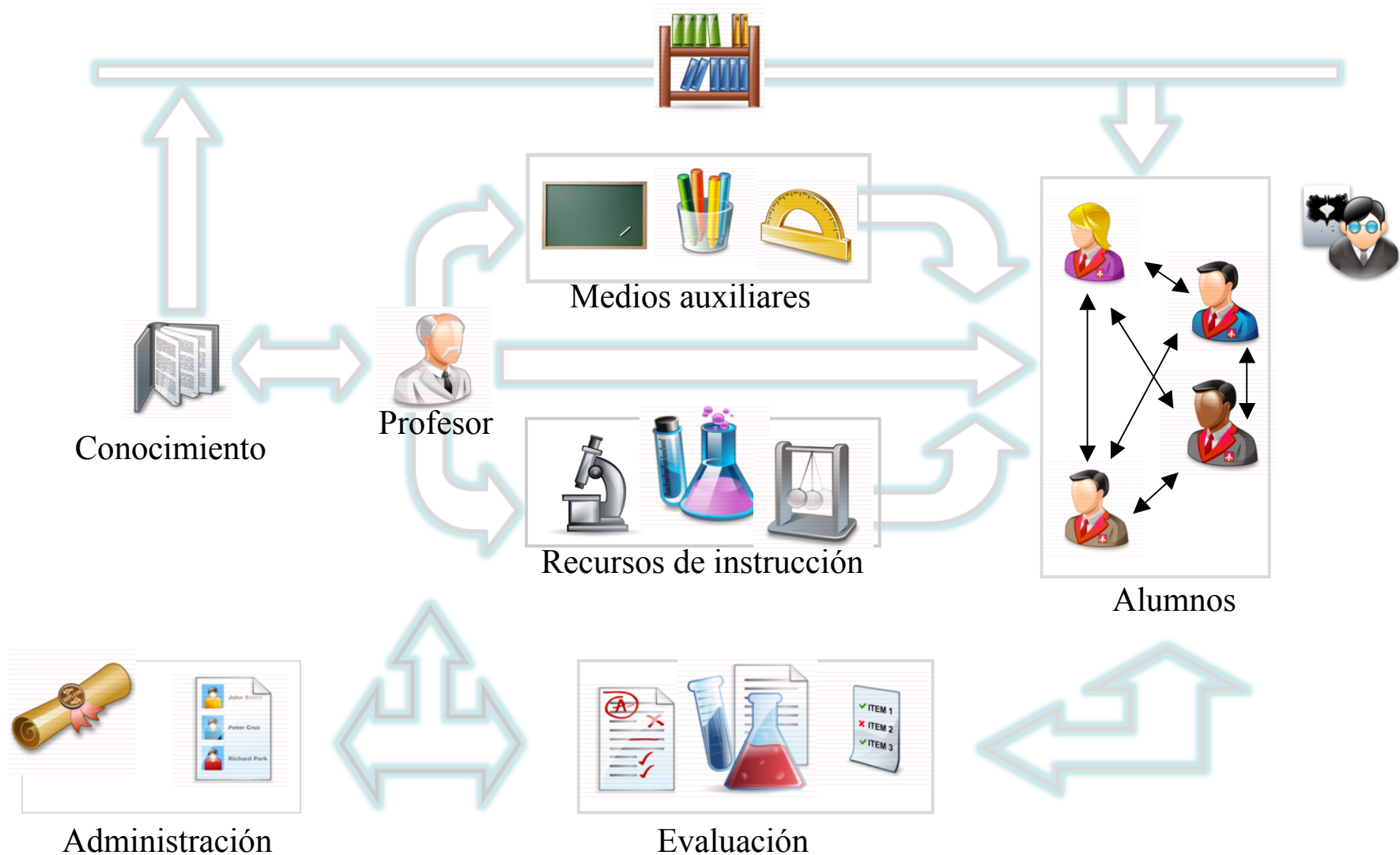
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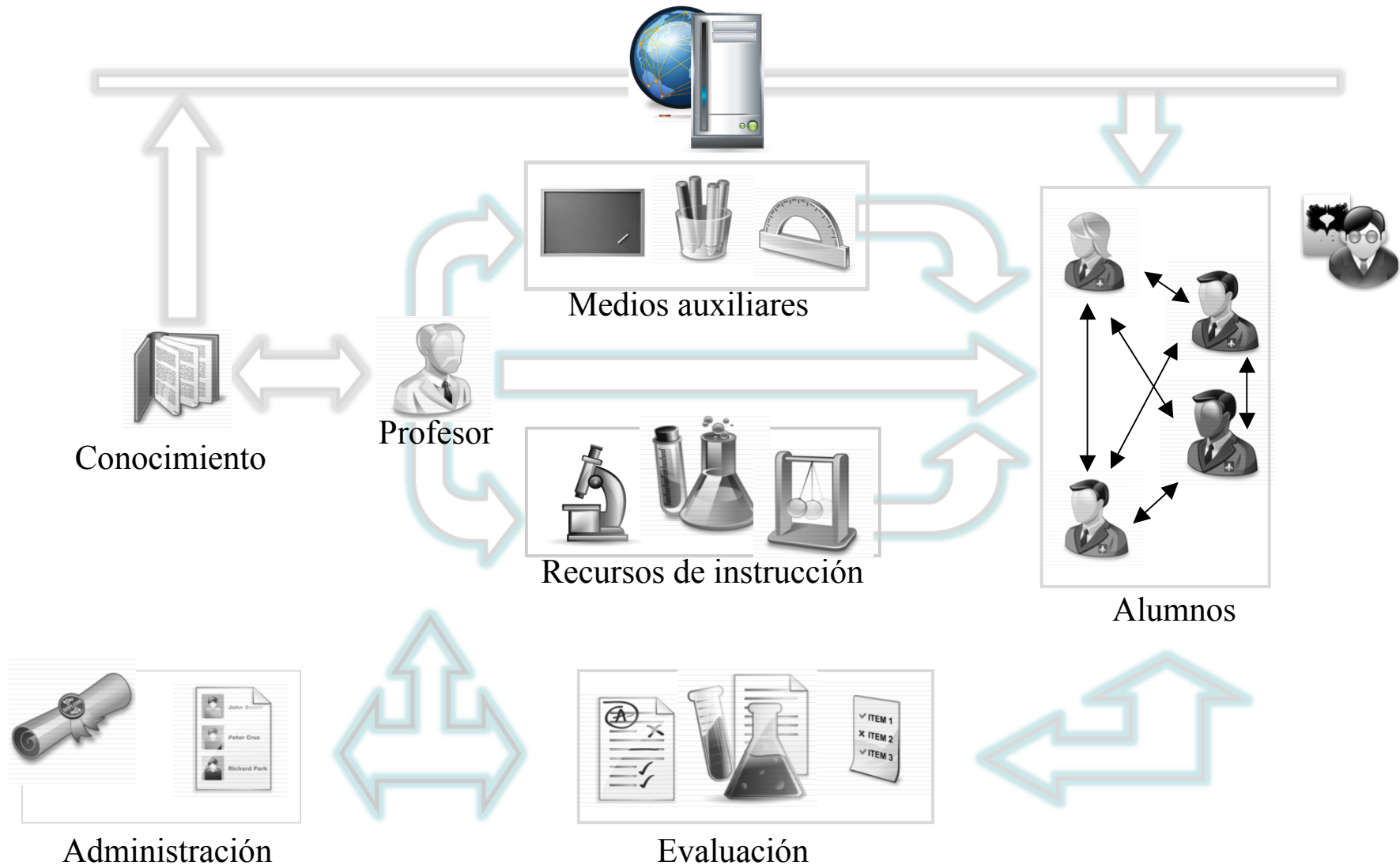
Ciencia y tecnología del eLearning



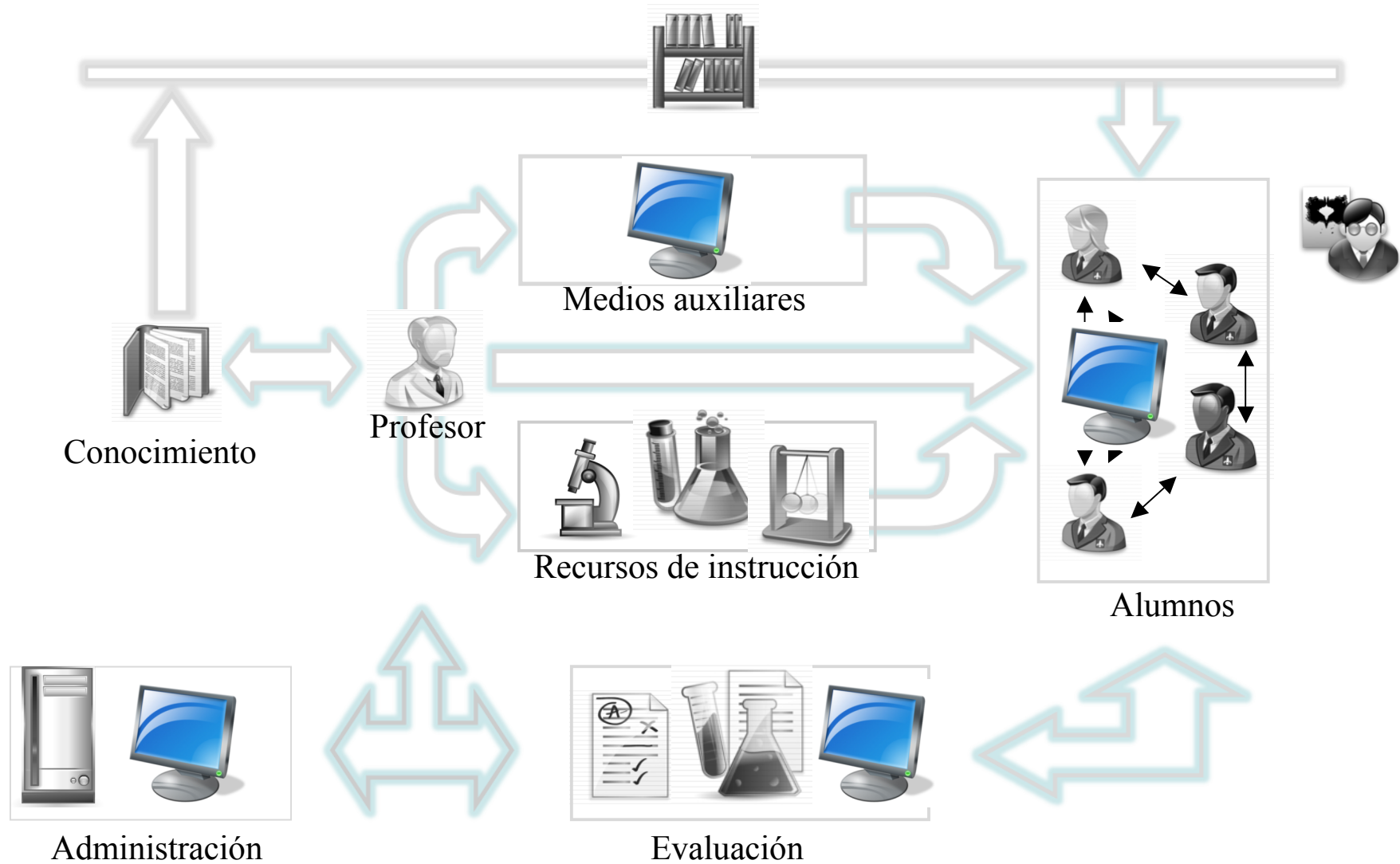
Proceso de enseñanza y aprendizaje



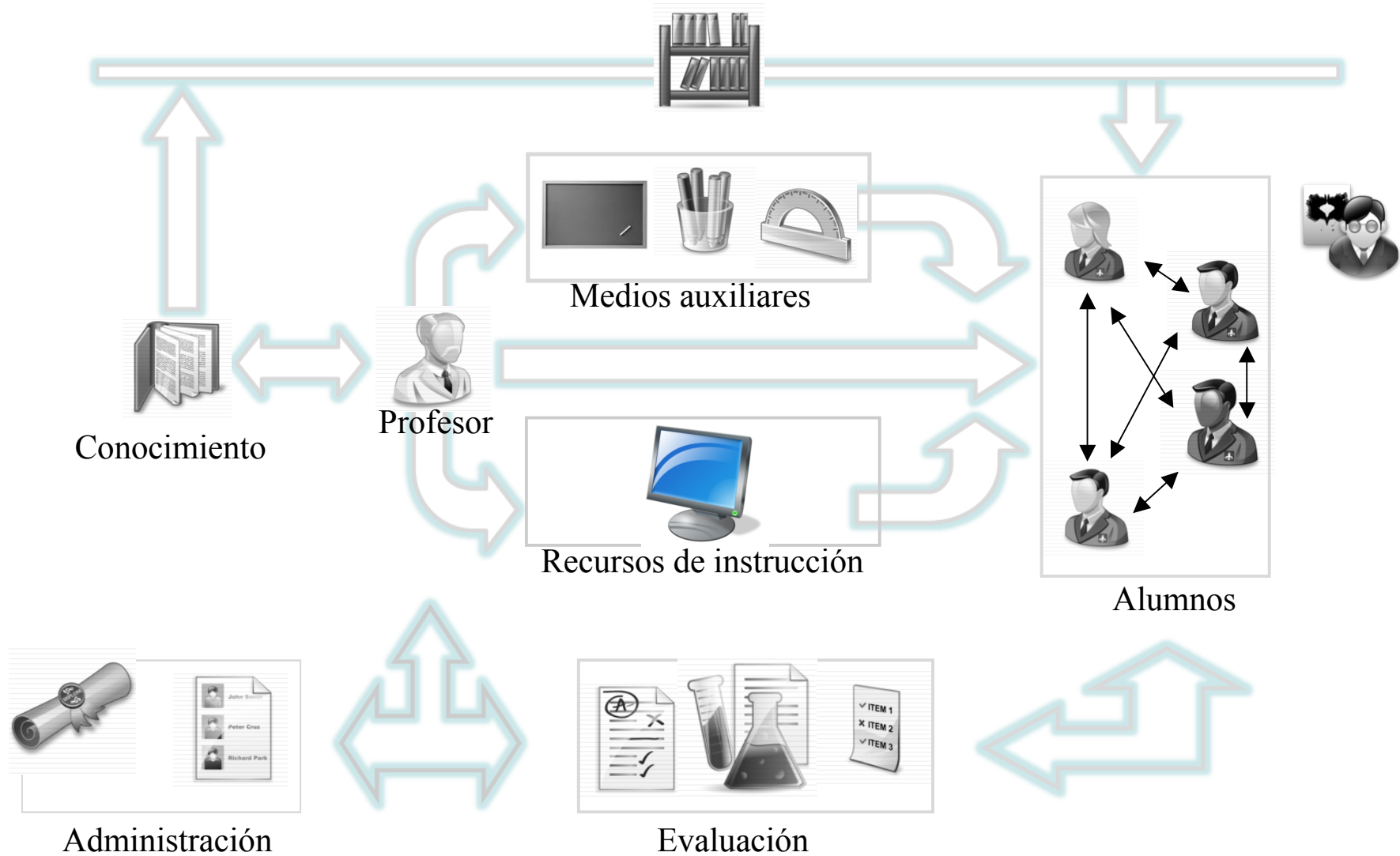
El conocimiento en Internet



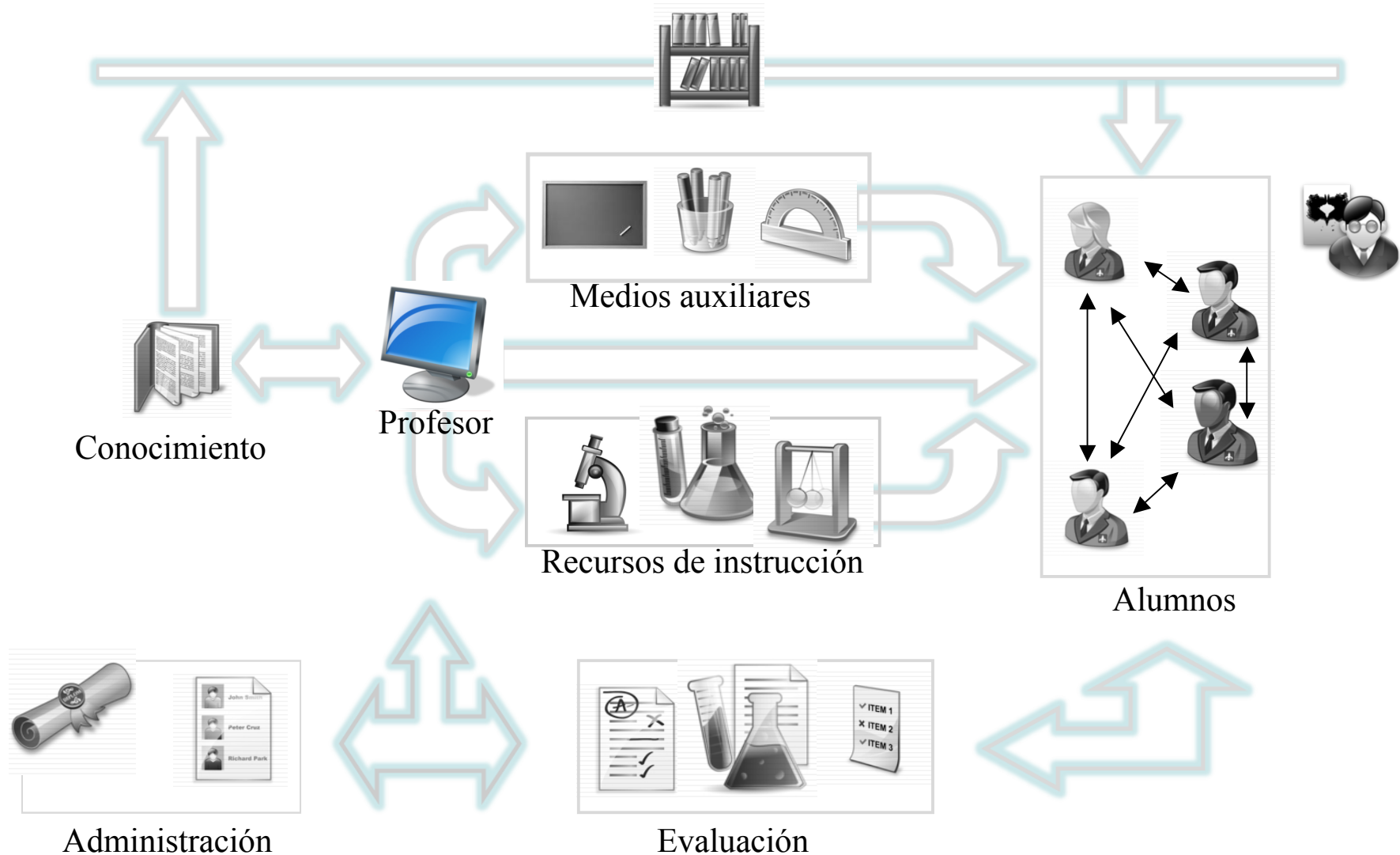
Plataformas de eLearning



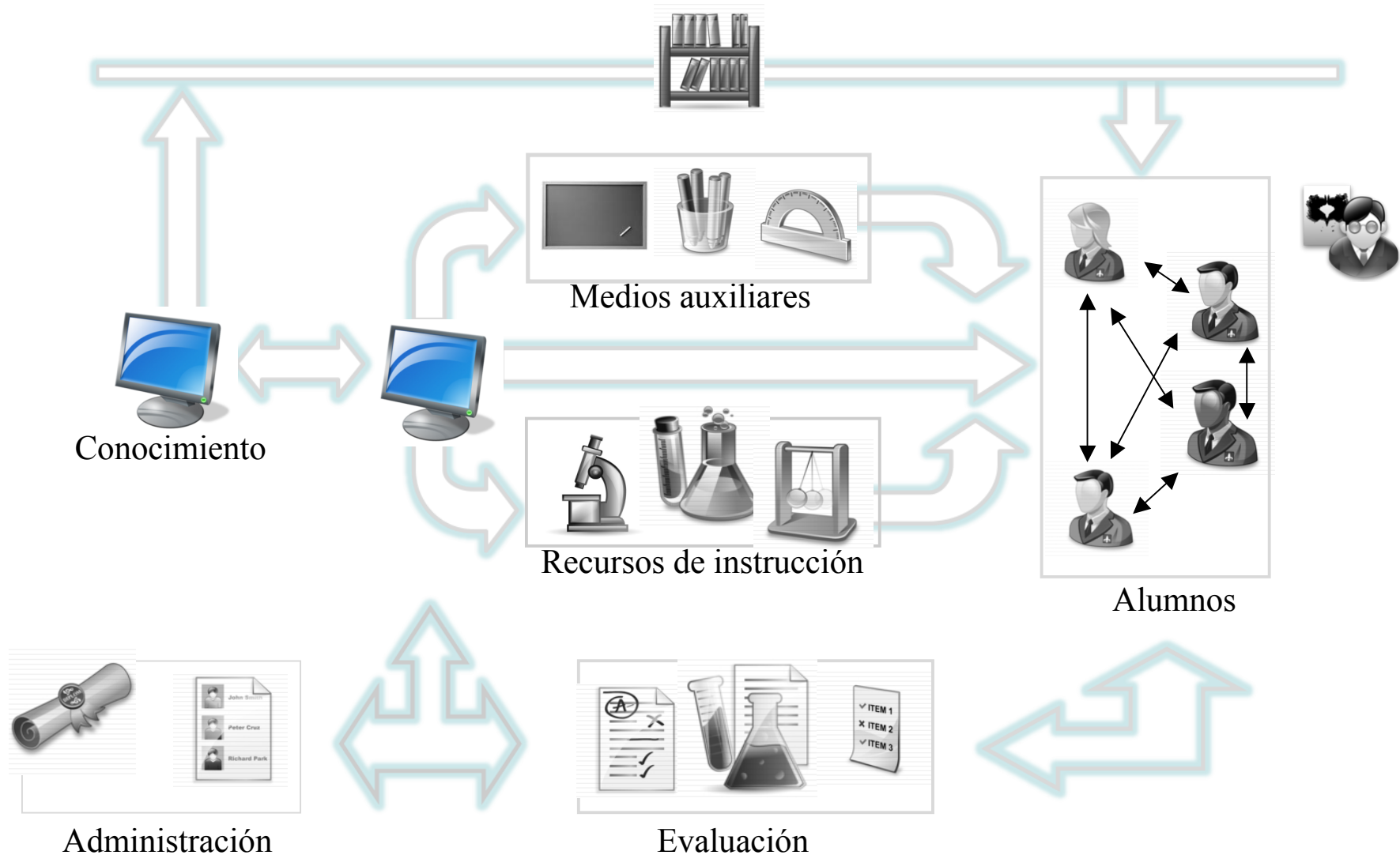
Laboratorios virtuales



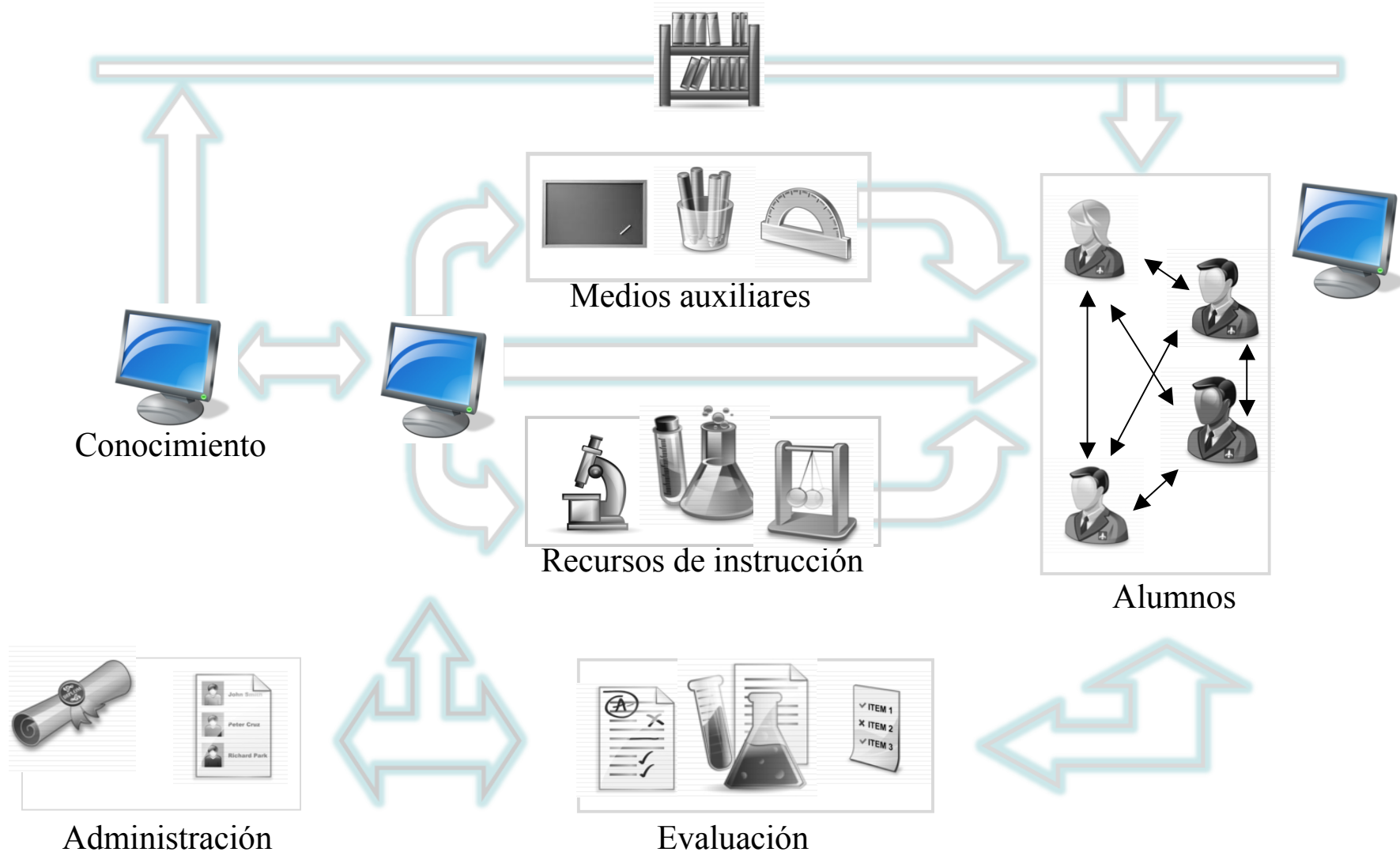
Enseñanza asistida por ordenador



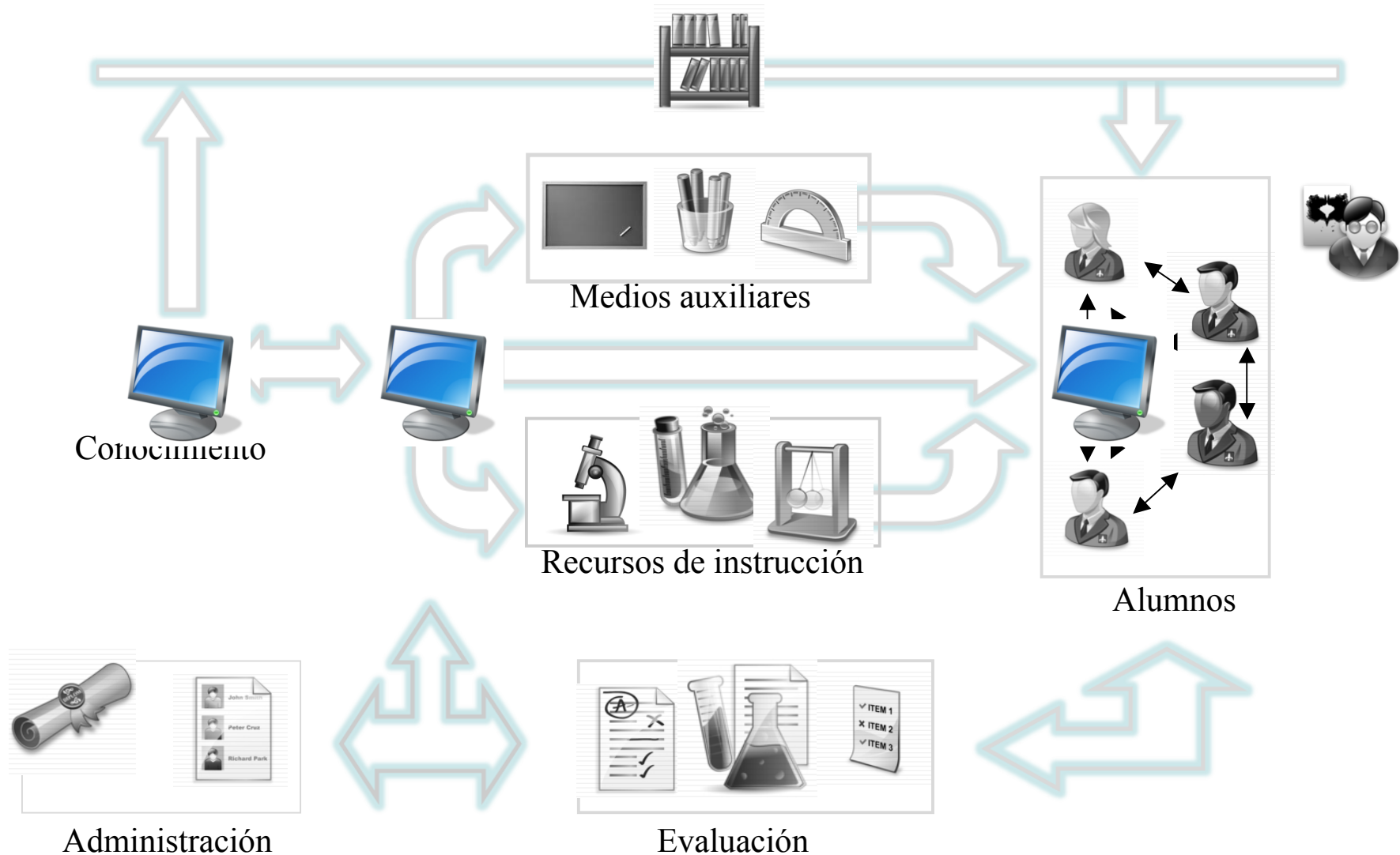
Sistemas tutores inteligentes



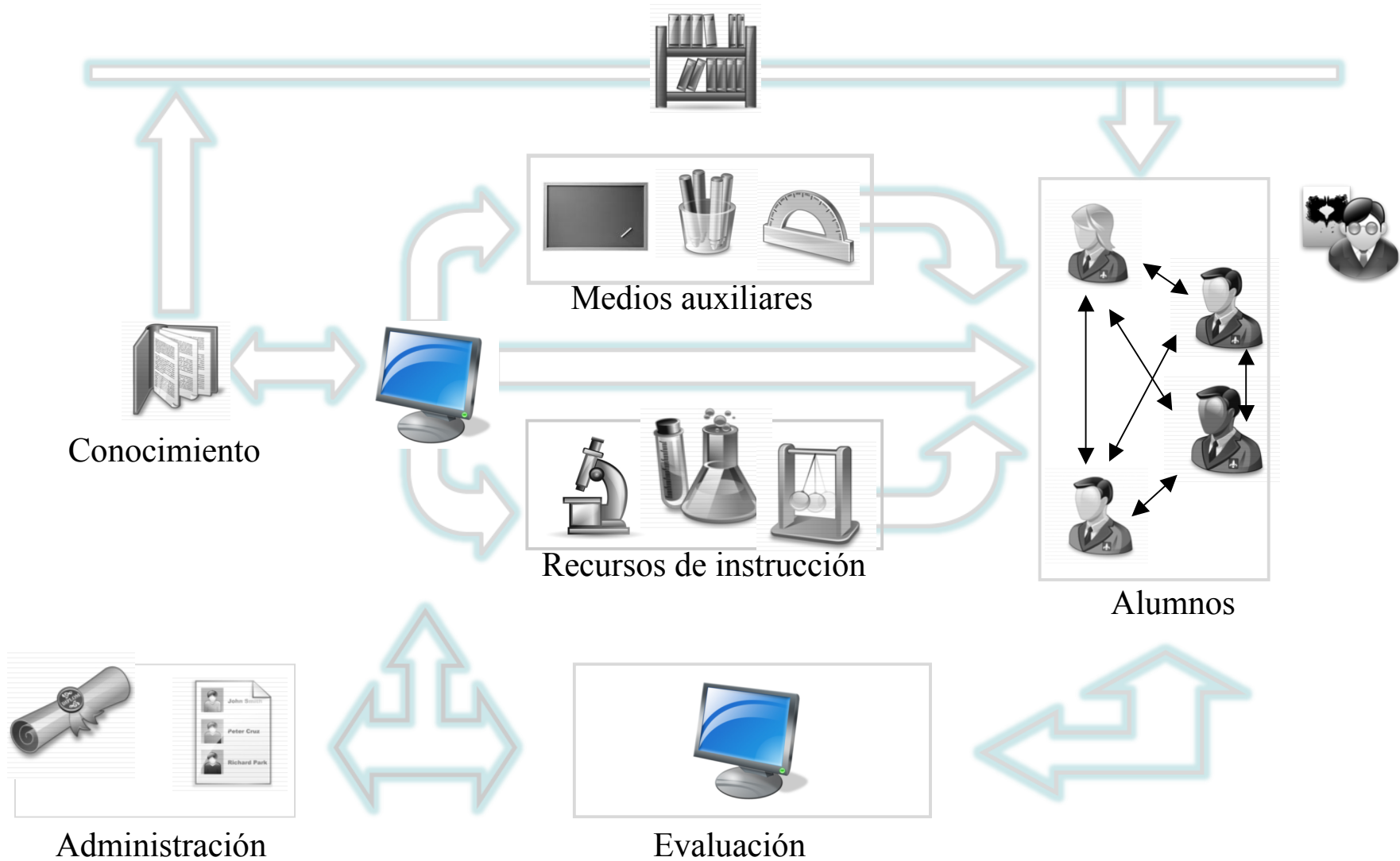
Aprendizaje afectivo y metacognitivo



Aprendizaje colaborativo

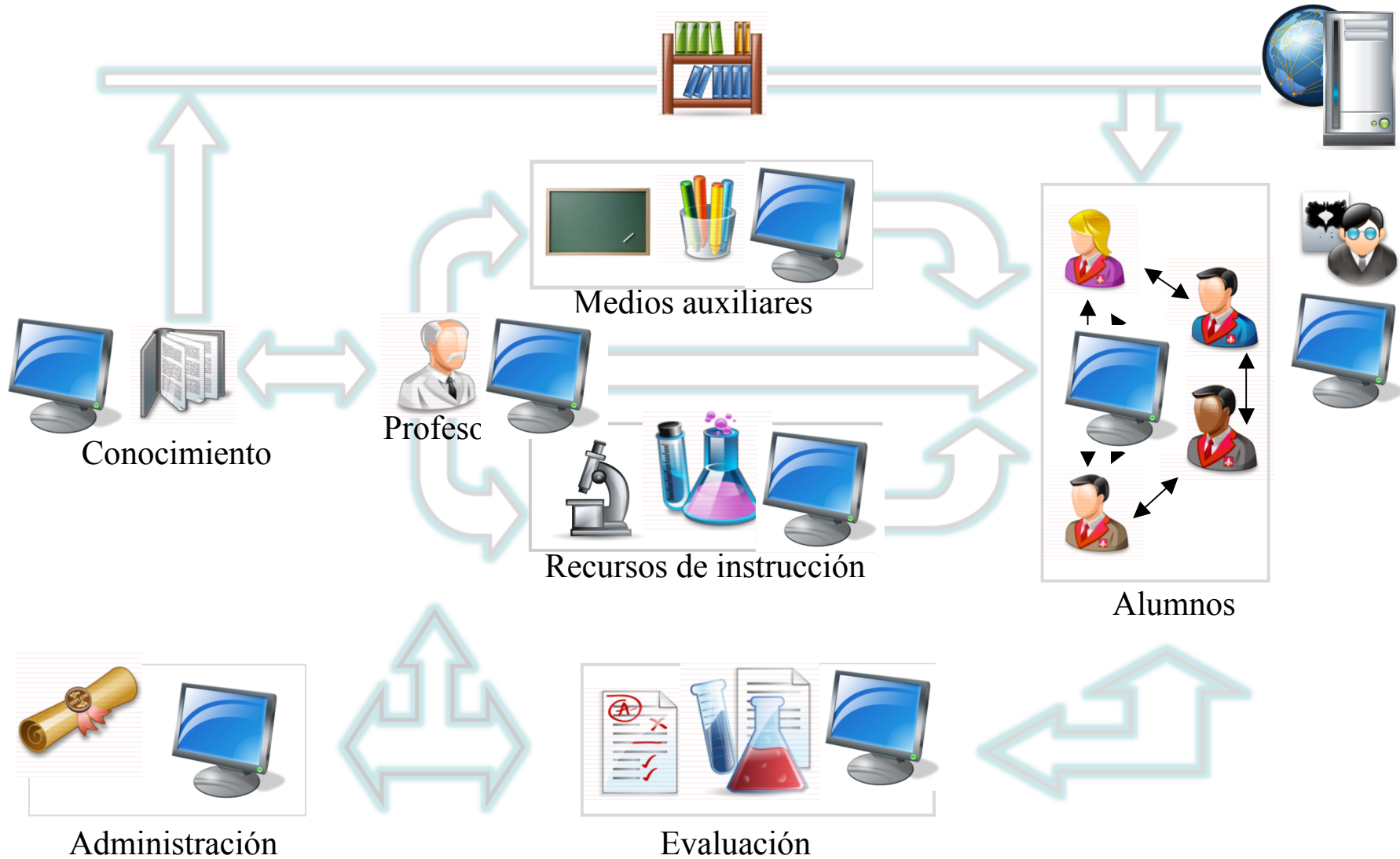


Evaluación automática



Aprendizaje mixto

(Blended learning)



Plataformas de *eLearning*

(*Learning Management Systems*)

- Soporte para comunicación entre el alumno y el profesor.
- Soporte para algunas tareas colaborativas simples.
- Soporte para tareas de evaluación simples.
- Soporte para la gestión de notas, tareas, actividades, etc.
- Almacen de “*objetos de aprendizaje*”.



Blackboard



Plataformas de *eLearning*

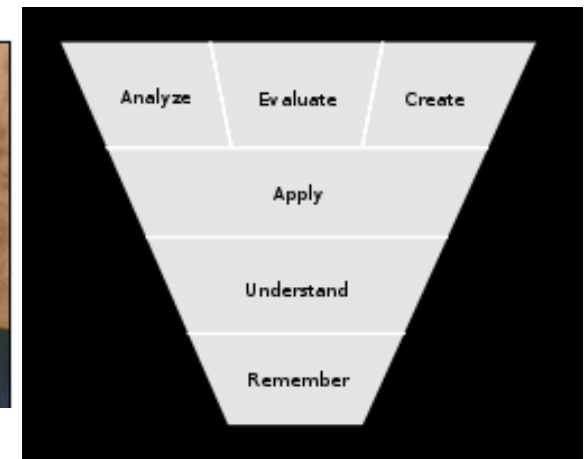
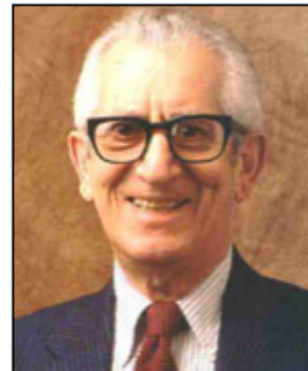
(*Learning Management Systems*)

- Problemática actual...
 - Interoperatividad.
 - Con bases de datos corporativas y otros sistemas de gestión.
 - Reutilización de contenidos.
 - Estandarización.
 - IMS
 - IEEE LTSC-LOM
 - AICC
 - SCORM
 - Accesibilidad.
 - Adaptabilidad.



Conceptualización del aprendizaje

- Zona de desarrollo próximo (Vygotski, 1930...)
- Desarrollo cognitivo (Piaget, 1930...)
- Teoría constructivista (Piaget, 1950-1960...)
- Psicología cognitiva (Bruner, 1960...)
- Taxonomía de Bloom (1950...)



Enseñanza asistida por ordenador

(Computer Assisted Learning)

WHAT IS CHILE?

A COUNTRY

THAT'S FINE.

SELECT AN ALTERNATIVE FROM THE LIST:

.214000.
800300.
49883.
63690.

FOR THE QUESTION:

APPROX WHAT IS THE AREA OF CHILE?

800300

YOUR ANSWER IS INCORRECT.
THE CORRECT ANSWER IS: 214000.

THE POPULATION IN CHILE IS APPROX 8500000. PEOPLE.
TRUE OR FALSE?

TRUE

YOU ARE CORRECT.

USE ONE OF THE FOLLOWING:

SUCRE
FRENCH
ARGENTINA
SPANISH

TO ANSWER THE QUESTION:

WHAT IS THE LANGUAGE IN CHILE?

*
YOU ARE TAKING TOO MUCH TIME...

SPANISH

YOU SHOULD HAVE WRITTEN "SPANISH".

VERY GOOD.

The screenshot shows a graphical user interface for a computer-assisted learning system. At the top, there are menu items: 'KB Windows', 'Consult', and 'Help'. The main window displays a patient's history and a series of questions. The patient's name is 'Mary', age is '42 YEARS', and sex is 'FEMALE'. The questions are:

- 1) ** Mary
- 2) Please describe the chief complaints:
** HEADACHE
** STIFF-NECK-ON-FLEXION
** NAUSEA
- 3) For how long has Mary's headache lasted?
** 10 DAYS
- 4) How severe is Mary's headache (on a scale of 0 to 4 with 0 for very mild and 4 for very severe)?
** 3
- 5) Does Mary have a fever?

The interface also shows a 'Differential' window with the following hypotheses:

HYPOTHESIS	CF	CUMCF
CHRONIC-MENINGITIS	200	
VIRAL-MENINGITIS	200	

Another window shows 'Evidence for INFECTIOUS-PROCESS' with the following findings:

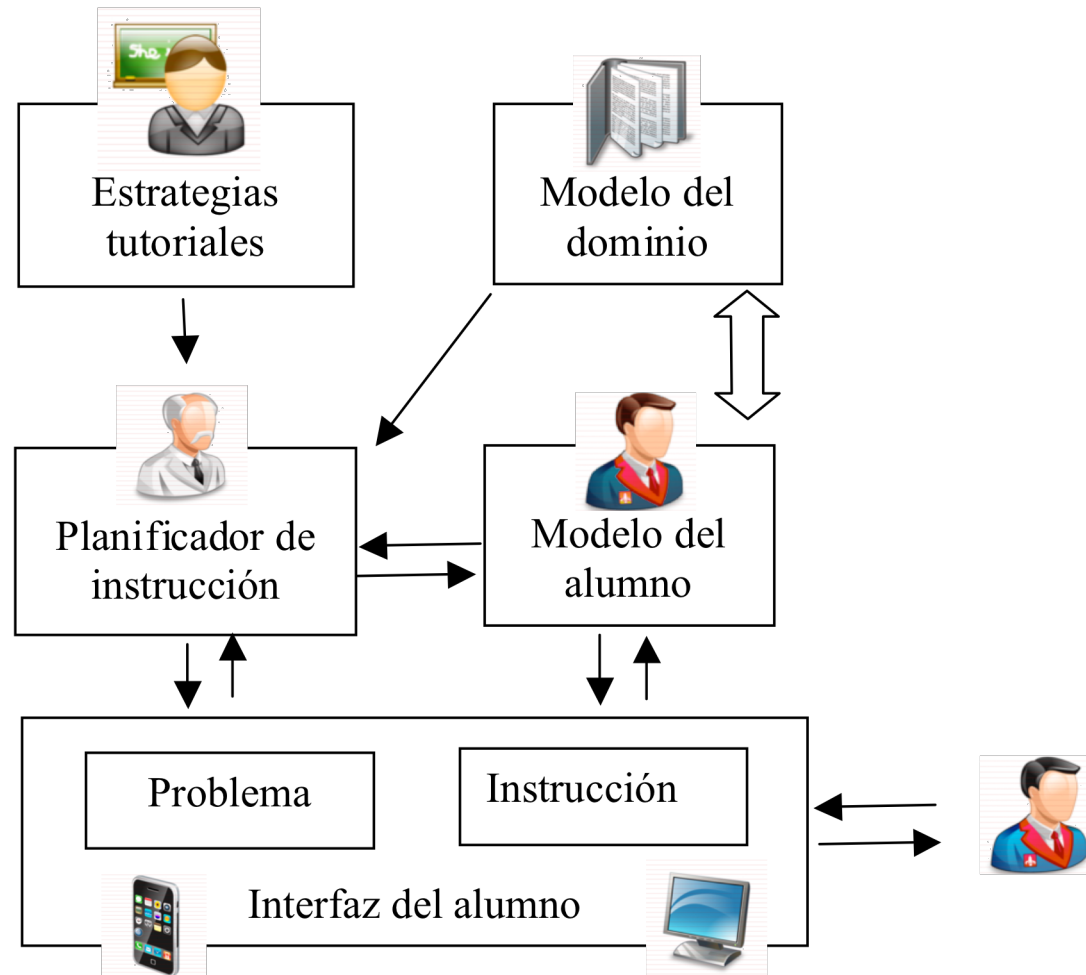
FINDING	RULE(S)	MAXCF	MINCF
FEBRILE	RULE423	700	
WBC	RULE350	500	
PMNS	RULE350	500	
BANDS	RULE350	500	

A third window shows 'Hypotheses With Evidence' with the following hypotheses:

HYPOTHESIS	CF	CUMCF
MENINGITIS	500	600
INFECTIOUS-PROCESS	---	600
CHRONIC-MENINGITIS	200	
VIRAL-MENINGITIS	200	
ACUTE-MENINGITIS	---	200

Sistemas Tutores Inteligentes

(Intelligent Tutoring Systems)



Sistemas Tutores Inteligentes

(Intelligent Tutoring Systems)

ANDES Physics Workbench - (P11-2-Solution.fbd)

A 2000-kg car in neutral at the top of a 20-degree inclined driveway 20 m long slips its parking brake and rolls down. Assume that the driveway is frictionless.

At what speed will it hit the garage door?

Answer:

Remember that 'normal' means that the force is perpendicular to the surface that is causing it.

Variables:

Name	Definition	X-Comp	Y-Comp
t0	car starts rolling		
t1	car hits garage door		
Fnet	magnitude of the Net Force on car at tim...	Fnet_x	Fnet_y
a	magnitude of the average Acceleration of...	a_x	a_y
mcar	mass of car		
v1	magnitude of the instantaneous Velocity ...	v1_x	v1_y
W	magnitude of the Weight Force on car at ...	W_x	W_y
N	magnitude of the Normal Force on car at ...	N_x	N_y

1. $F_{net,x} = mcar \cdot a_x$

2. $W = mcar \cdot g$

3. $F_{net,x} = N_x + W_x$

4. $F_{net,y} = W_y + N_y$

Carnegie Learning™ 2.4.7 Math Help

Tom bought 25 candies for 19 dollars. He only bought candies worth 1 dollar or 50 cents. How many one-dollar candies did he buy? How many fifty-cent candies did he buy?

$x = 1$ dollar candies $y = 50$ cent candies

$$\begin{aligned} x + y &= 25 \\ -(1x + 0.5y) &= 19 \\ \hline 0 + 0.5y &= 6 \\ .5y \div .5 &= 6 \div .5 \\ y &= 12 \end{aligned}$$

$$\begin{aligned} x + y &= 25 \\ x + 12 &= 25 \\ \hline x + 12 - 12 &= 25 - 12 \\ x &= 13 \end{aligned}$$

Tutor: Here are some hints for your question and you will soon see me writing on your drawing board.

Student: Ok. Thank you.

Tutor: First, let's set the variables.

Student: Ok.

Tutor: We will make "x" be the amount of 1 dollar candies and "y" the amount of 50 cent candies.

Tutor: So a plus y must be 25.

Student: But how do we solve for x?

Tutor: Not possible yet. We first need a second equation because we have 2 variables.

Student: Ok. What is the second equation?

Tutor: To do this, we will use the information from the cost of the

A new hint appears every time you click "help"

Area $ABE = \frac{4 \times 5}{2}$

Area $BCDE = \text{side} \times \text{side}$
 $16 = \text{side}^2$
 $\sqrt{16} = \text{side}$
 $\text{side} = 4$

If the area of square BCDE is 16 and AB is 5, what is the area of ACDE?

The condor is the largest flying bird in North America, with a wingspan over 9 feet. It is also an endangered species. The American condor population was 31 in 1969. Since 1969, the population has increased at the rate of 3 each year.

- How many condors are there if the current year is 1992?
- How many condors will there be in the year 2000?
- How many condors will there be in the year 2100?
- How many condors will there be in the year 2100?
- If the condor population had been changing at this rate before 1969, how many condors would there have been in 1960?

For the formula, define a variable for the elapsed time since 1969 in years and use this variable to write a rule for the condor population.

Heading	time	condors
Unit	days <input type="text" value="1"/>	<input type="text"/>
Formula	<input type="text"/>	<input type="text"/>
Question 1	<input type="text"/>	<input type="text"/>
Question 2	<input type="text"/>	<input type="text"/>
Question 3	<input type="text"/>	<input type="text"/>
Question 4	<input type="text"/>	<input type="text"/>
Question 5	<input type="text"/>	<input type="text"/>

Although you could measure the elapsed time in days, you should use years in this problem.

Use Java?
 Hide skillmeter?

Enter Unit

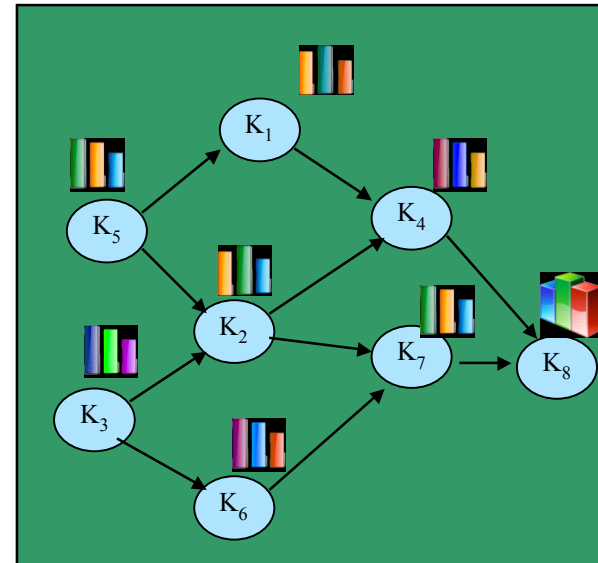
Enter Label

Modelado del alumno

(Learner model - Student model - User model)

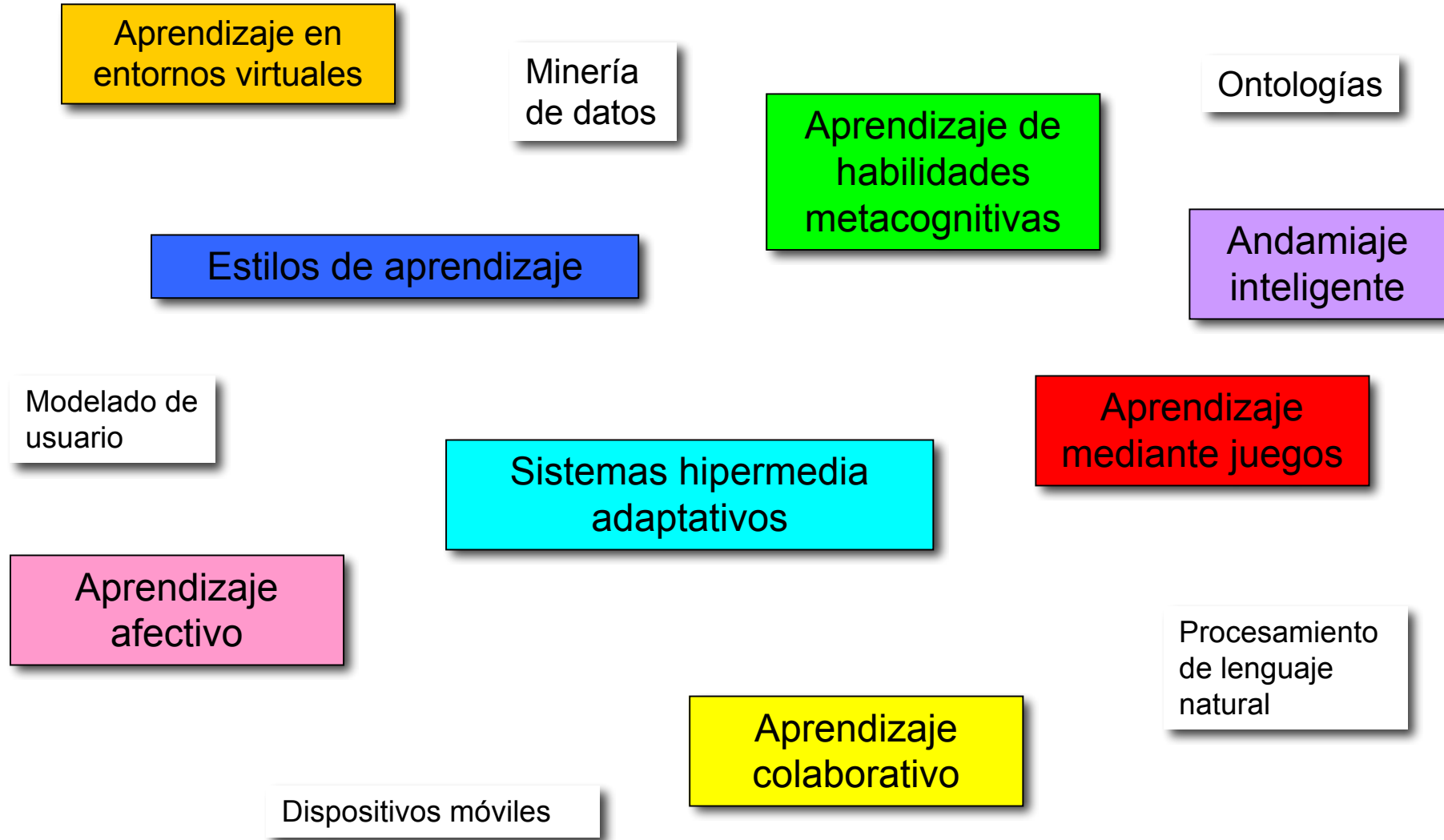


- Modelo de conocimiento.



- Modelo afectivo.
- Modelo de grupo.

Nuevas líneas de investigación



Sistemas Hipermedia Adaptativos

(Adaptive Hypermedia)

- **Sistemas hipermedia**
 - Libertad de navegación por el contenido.
 - Presentación de la información mediante enlaces.
 - Organización no secuencial.
- **Sistemas hipermedia adaptativos.**
 - Anotar los enlaces.
 - Suprimir/Destacar enlaces.
 - Reorganizar los enlaces de manera mas adecuada.
 - Ampliar/Reducir contenidos.
 - Recomendar enlaces y contenidos.

Sistemas Hipermedia Adaptativos

(Adaptive Hypermedia)

Netscape: ELM-ART: Lisp-Course

LISP Course
Lesson 1
Functions
List-access Functions
First and Quote
Rest
Examples of List-access (with exercises)
Finding List-access Examples (with exercises)
GET-THIRD-ELEMENT (programming task)

Chat Room

LISP Constructs
FIRST QUOTE
REST

Private Notes on this Page

To the Exercises

Exercises for Practicing

Here are some exercises for the calling of list access functions. The correct solutions are given and explained on the following page. But firstly, try to solve the problems yourself.

Exercises:
You should work at the following exercises:

What is the result of evaluating the following expression?
(ERROR, if the evaluation will result in an error!)

(FIRST (REST (BROT KAFFEE MILCH ZUCKER)))
Error

(FIRST (REST '(BROT KAFFEE MILCH ZUCKER)))
Kaffee

(FIRST '(REST (BROT KAFFEE MILCH ZUCKER)))

'(FIRST (REST (BROT KAFFEE MILCH ZUCKER)))

submit reset

Working at this page is not yet recommended.

KnowledgeSea v2.0 - TALER - Microsoft Internet Explorer

Address: http://r.exp.sis.pitt.edu/ks2/default.jsp

KnowledgeSea v2.0

Help

Search in KnowledgeSea Submit

operator, loop, expression L11	operator, loop, expression L14	operator, expression, value L18	data, type, variable L8	data, type, variable L9	variable, data, type	variable, function, declaration	function, variable, declaration L18 L20
loop, operator, statement	operator, expression, loop L16	language, operator, problem	data, type, variable, type L9	data, variable, type	variable, declaration, function	function, variable, declaration	function, variable, declaration L18 L20
loop, statement, operator L12 L15	statement, loop, operator L16	language, statement, problem	language, problem, work	language, data, problem	memory, variable, structure	memory, function, pointer	function, memory, pointer
statement, compiler, loop	language, compiler, run L7	language, problem, run	language, problem, scanf	memory, scanf, language	memory, pointer, structure	pointer, memory, function	pointer, memory, function
file, compiler, include	compiler, file, language	language, compiler, run L7	language, problem, scanf	scanf, language, memory	memory, pointer, scanf	pointer, memory, array L21	pointer, memory, array
file, compiler, include	file, compiler, run	language, compiler, scanf	scanf, string, printf	scanf, string, character	pointer, string, memory, string	pointer, memory, array	pointer, memory, array

Netscape: Glossary and Concepts

Back Forward Reload Home Search Guide Images

ALL A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- problem testing
- procedural knowledge
- procedural memory
- production
- Production parameter
- Production parameters
- Production Parameters Diagram
- Production parameters view
- production rule

Production

Productions are [condition](#)→[action](#)→ rules which specify what to do in a situation.

This concept is introduced on these pages:

- 1.1.2 Production Rules in ACT-R
- 1.1.3 Production Rule Format
- Section 1.5: Creating Declarative Structure
- Production

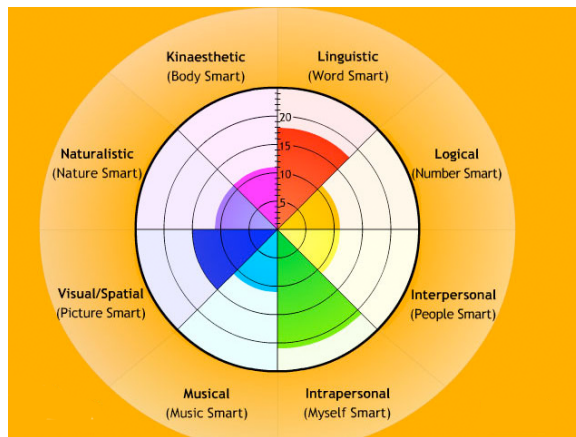
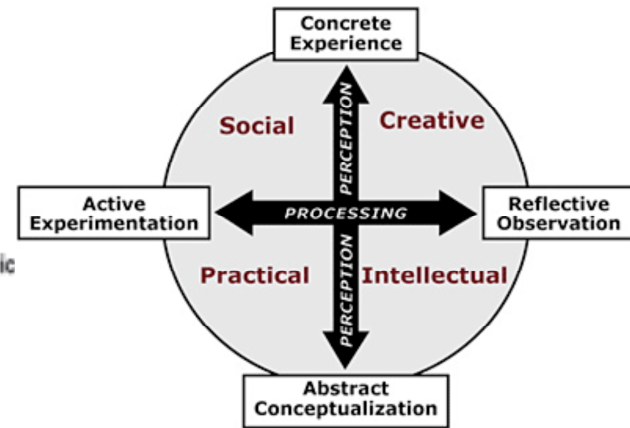
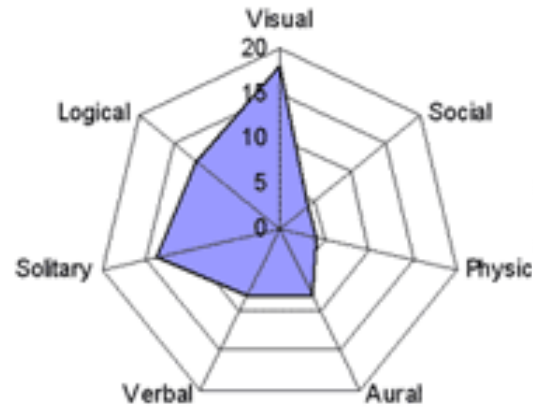
Knowledge about this concept is required for:

- Section 1.6: Writing Productions
- Section 2.1: English Rules
- Selecting non-atomic elements
- Run Arguments

Estilos de aprendizaje

(Learning styles)

- Kolb
- Munford
- Gregorc
- Sudbury
- Flemming
- Felder-Silverman

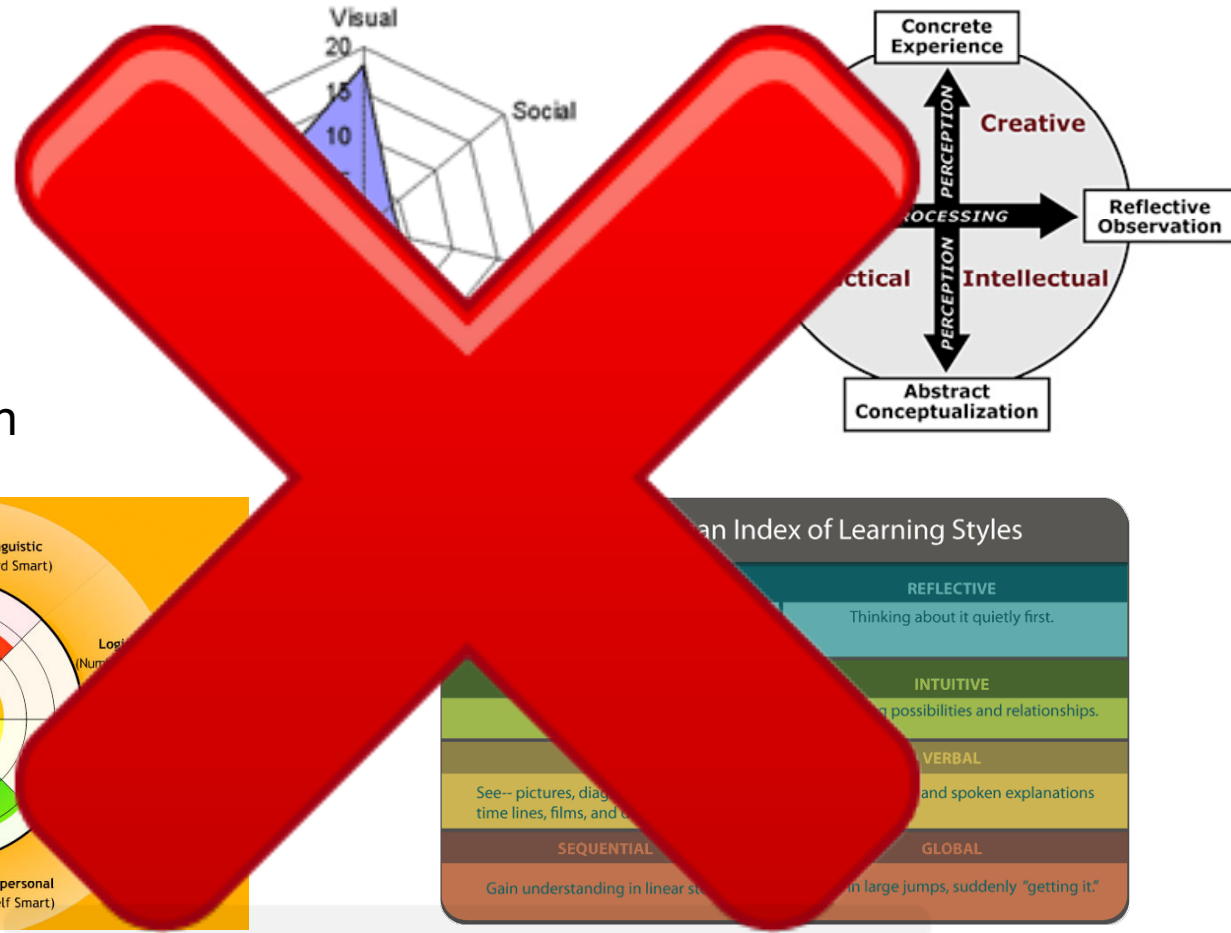


Felder-Soloman Index of Learning Styles	
ACTIVE	REFLECTIVE
Doing something active with it. Discussing, applying, or explaining it to others.	Thinking about it quietly first.
SENSING	INTUITIVE
Learning facts.	Discovering possibilities and relationships.
VISUAL	VERBAL
See-- pictures, diagrams, flow charts, time lines, films, and demonstrations.	Words-- written and spoken explanations
SEQUENTIAL	GLOBAL
Gain understanding in linear steps	Learn in large jumps, suddenly "getting it."

Estilos de aprendizaje

(Learning styles)

- Kolb
- Munford
- Gregorc
- Sudbury
- Flemming
- Felder-Silverman



Aprendizaje afectivo

(Affective learning)

- Los estudiantes son personas que experimentan emociones al interactuar en el proceso enseñanza-aprendizaje:

- Aburrimiento.
- Interés.
- Frustración.
- Ansiedad.



Confident



Excited



Bored



Focused



Frustrated



Anxious

- Para una mejor instrucción el sistema debe:
 - Detectar las emociones.
 - Adaptarse a ellas.

Aprendizaje afectivo

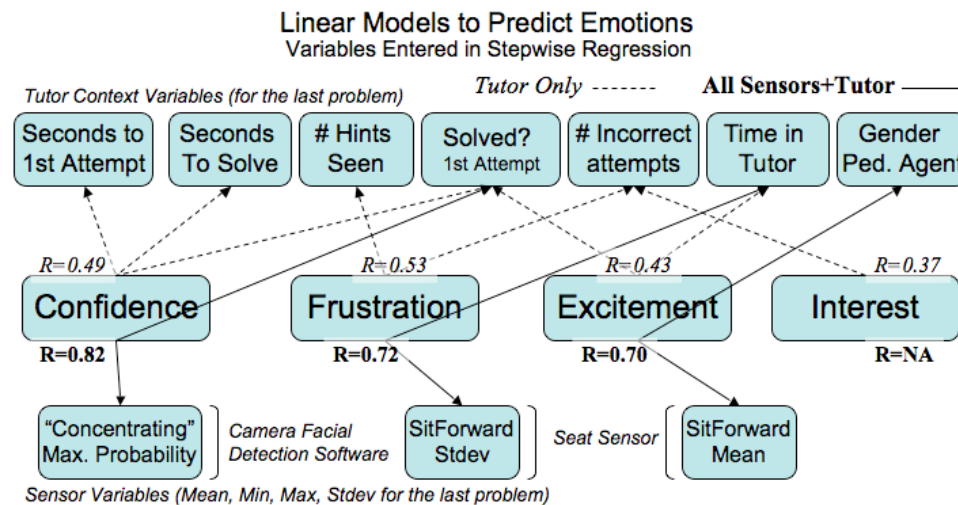
(Affective learning)

- Detectar las emociones.
 - Preguntas directas al alumno.
 - Inferencia a través de las interacciones.
 - Mediante sensores.

How are you feeling?

Considering that your tutor (and possibly your colleagues) will be able to view your score and know your performance, please select the most dominant emotion that you are currently feeling with regards to the upcoming test.

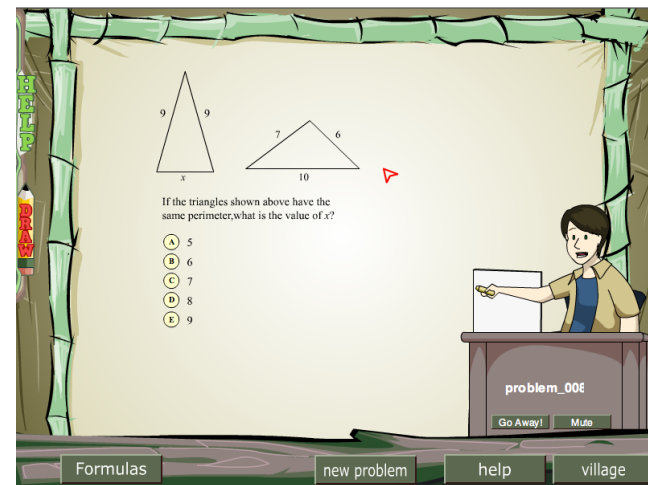
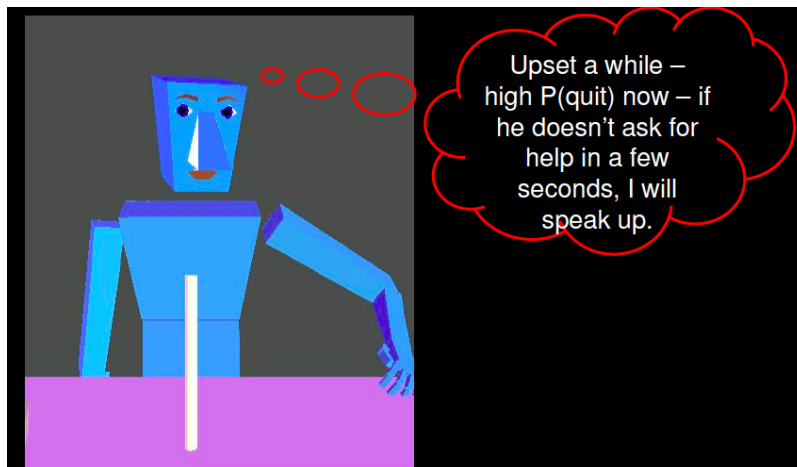
<input type="radio"/> Joy	<input type="radio"/> Relief	<input type="radio"/> Disappointment	<input type="radio"/> Distress
<input type="radio"/> Confident	<input type="radio"/> Intrigue	<input type="radio"/> Anxious	<input type="radio"/> Boredom
<input type="radio"/> Pride	<input type="radio"/> Gratitude	<input type="radio"/> Remorse	<input type="radio"/> Anger
<input type="radio"/> Compassion	<input type="radio"/> Admiration	<input type="radio"/> Resentment	<input type="radio"/> Reproach
<input type="radio"/> Other			
<input type="button" value="Submit Emotion"/>			



Aprendizaje afectivo

(Affective learning)

- Interactuar con las emociones.
 - Mediante modificaciones en el interfaz, expresiones en lenguaje natural, “agentes pedagógicos” (avatares).
 - Adaptando la respuesta afectiva (mostrar empatía, comprensión).
 - Adaptando la tarea propuesta para realizar. (proponer ayudas, tareas mas fáciles, evitar repeticiones)

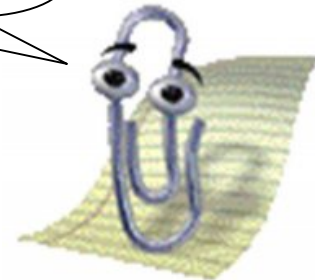


Aprendizaje afectivo

(Affective learning)

- A veces, al no tener en cuenta aspectos relacionados con la afectividad el sistema puede generar rechazo.

Parece que está usted
intentando escribir una carta.

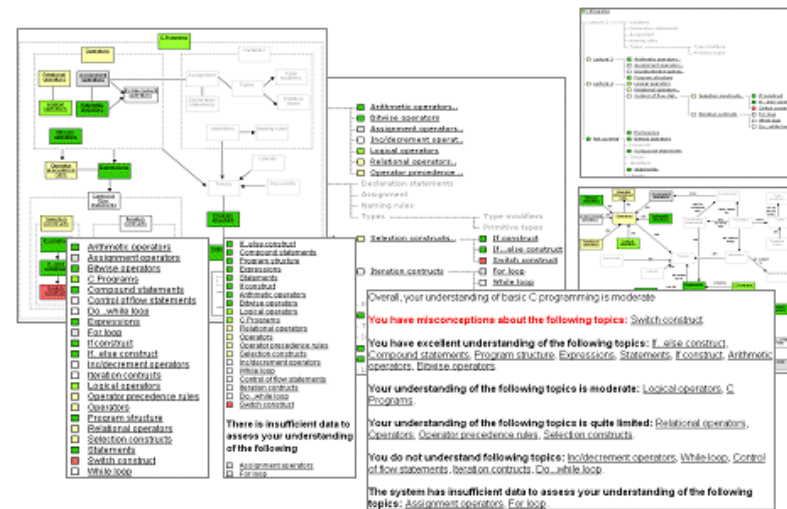
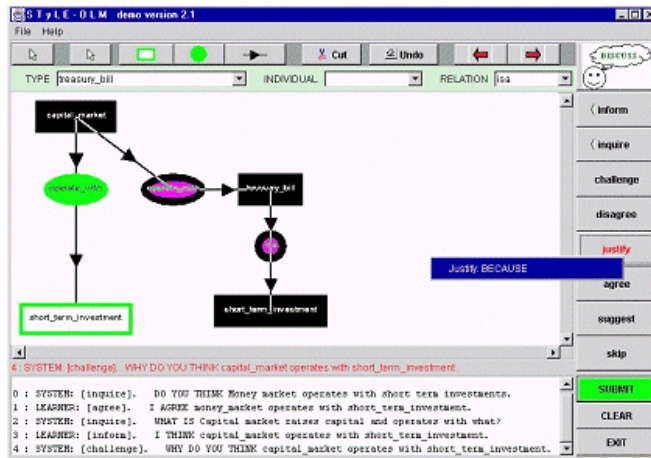


Aprendizaje de habilidades metacognitivas

(Metacognitive skills)

- Un sistema tutor inteligente debe...
 - Seleccionar las informaciones más relevantes de una situación o problema.
 - Elaborar un plan de acción adecuado para solucionar dicho problema.
 - Programar y realizar la secuencia de acciones.
 - Evaluar el efecto de sus acciones y formular nuevos planes de acción.
- ... y enseñar al alumno a realizarlas...
 - Requiriendo auto-explicación tras la resolución de un problema.
 - Incluyendo mecanismos de auto-evaluación.
 - Ayudando en la auto-reflexión.
- Modelos de usuario abiertos.
 - El usuario interactúa con el modelo que el sistema tiene sobre el modificándolo para mejorar el comportamiento del sistema.

Modelos de usuario abiertos (Open Learner Models)



The screenshot shows the Adaptive Learning Environment (ALE) interface. On the left, there's a 3D model of a nucleus with various components labeled. The main window displays the 'Textual Learner Model' for 'Graphic Pipeline Concepts'. It lists concepts like 'Confusion between object and world coordinate systems' and 'Confusion between clipping and viewing coordinate systems'. A table shows 'Results of the test' for 'Graphic Pipeline Concepts' and 'Graphic Pipeline Misconceptions'. The overall score is 0 out of 18 attempted.

The screenshot shows the Haptic Learner Model interface. It features a 3D model of a coordinate system with a red sphere and a green sphere. The text 'Possible Misconception held about the world coordinate system' is displayed. Below the model, there's a 'Textual Learner Model' window showing 'Results of the test' for 'Haptic Learner Model'.

Aprendizaje mediante juegos

(Serious games / Exploratory learning)

- Características que debe tener un buen juego...
 - Promueven la competición, o proponen un reto personal a conseguir.
 - Proponen objetivos factibles de conseguir (para incrementar la motivación)
 - Organizados en etapas que pueden alcanzarse poco a poco.
 - Proporcionan retroalimentación inmediata.
 - Adaptan su dificultad para mantener al jugador interesado.
 - Incluyen técnicas de aprendizaje afectivo.
 - Son impredecibles. (Si no serían aburridos).
 - Requieren realizar tareas inmediatamente (enganchan).
 - Tienen reglas relativamente simples.
 - Son interactivos y permiten la exploración.
 - Tienen una interfaz gráfica atractiva.

Aprendizaje mediante juegos

(Serious games / Exploratory learning)

```
Welcome to "How the West Was Won".
What is your name?
=> Bob
Do you want to go first?
=> Yes

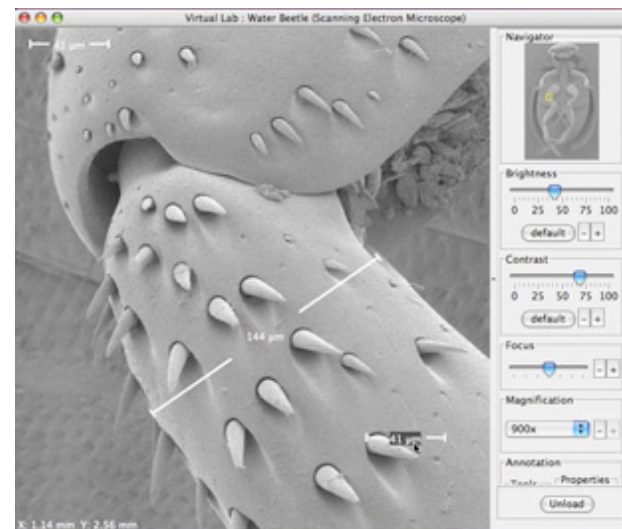
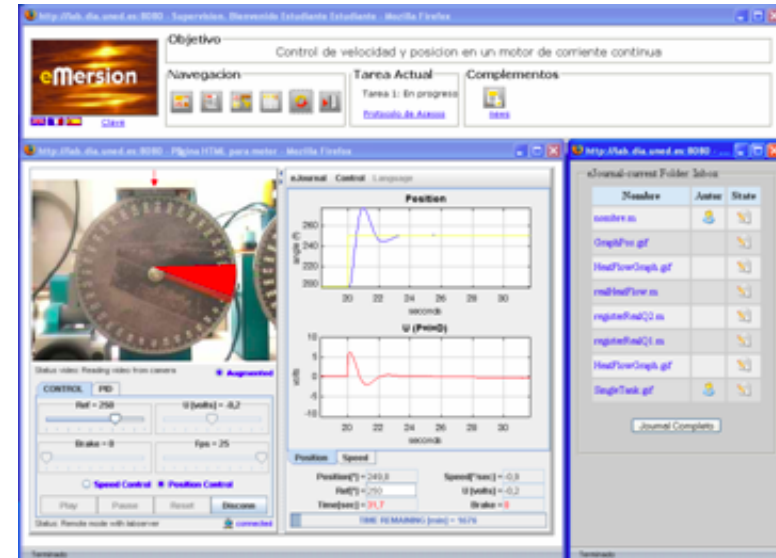
It's YOUR turn.. Spinners are: 1 2 2
What arithmetic expression did YOU form?
=> 1*2+2
What number does that give you?
=> 4

The numbers that could have been made
were:
-2 2 -1 -3 5 3 0 4 6 1
"best" move is (2*2)+1.
delta-ways: 13-1, 10-8, 6-1, 4-5, 3-2,
2-3, 1-3
Move ranks 11 which is FAIR
```



Aprendizaje en entornos virtuales (Virtual labs)

- Simuladores
- Laboratorios remotos



Aprendizaje colaborativo

(Collaborative learning)

- Aprendizaje cooperativo
 - Los alumnos realizan una tarea en conjunto, dividiéndola en partes y cada uno hace una parte.
- Aprendizaje colaborativo.
 - Los alumnos resuelven la tarea conjuntamente.



Aprendizaje colaborativo

(Collaborative learning)

		Tiempo	
		Síncrono	Asíncrono
Espacio	Local	<ul style="list-style-type: none">• Pizarras interactivas.• Mesas táctiles	
	A Distancia	<ul style="list-style-type: none">• Chat• Video conferencia	<ul style="list-style-type: none">• Email• Wikis• Blogs• Google Docs, Facebook, etc.

Aprendizaje colaborativo

(Collaborative learning)

- Áreas de investigación actual.
 - Construcción colaborativa de conocimiento.
 - Argumentación supervisada
 - Guiones de colaboración (*Collaborative scripts*)
 - Análisis de la colaboración.
 - Análisis del comportamiento de los individuos.
 - Análisis del comportamiento del grupo.
 - Nuevos entornos. (Wikipedia, Facebook...)
 - Nuevos dispositivos.
 - Teléfonos móviles, pantallas táctiles, etc..

Andamiaje inteligente

(Intelligent scaffolding)

- Proporcionar indicaciones adecuadas durante la realización de una tarea o problema.
 - Identificación del error.
 - Determinación de la causa.
 - Selección de la ayuda mas adecuada.
 - Determinación del momento de intervención.

El papel del profesor en el proceso de aprendizaje es proporcionar las estructuras necesarias para que el alumno alcance el siguiente nivel

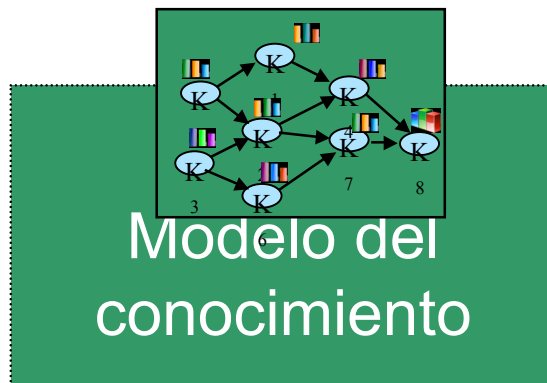
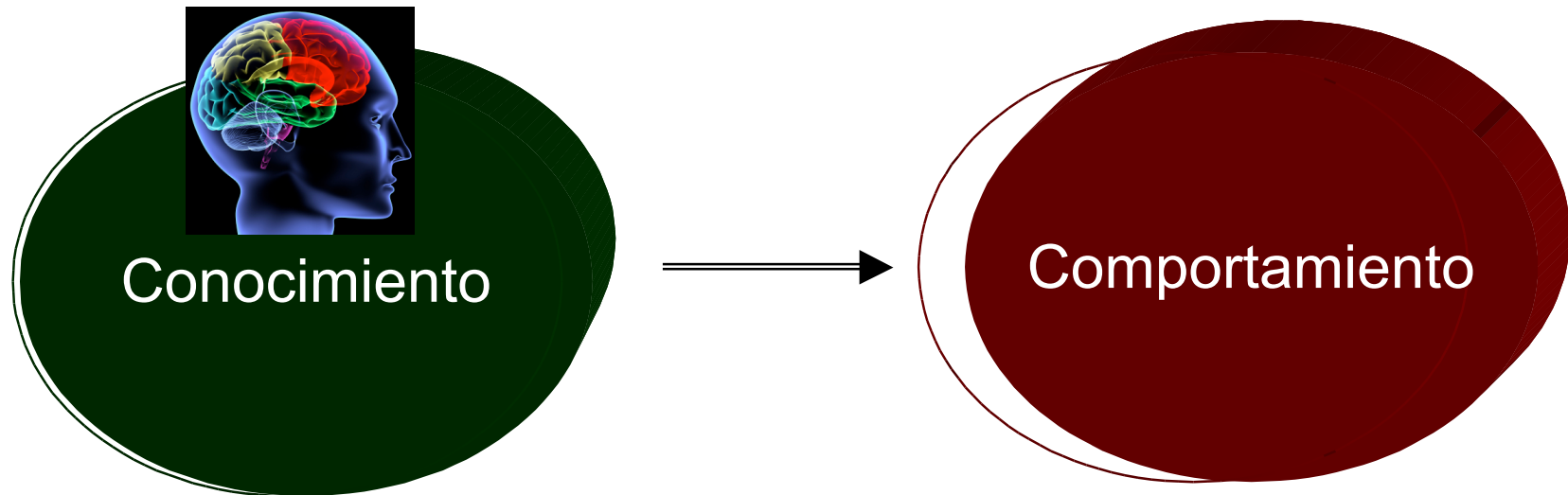


Vigotsky

A screenshot of the ASSISTments web interface. The browser address bar shows 'http://www.assistments.org/preview/assignment/1321#'. The page title is 'ASSISTments' and the subtitle is 'You are previewing content.' The main content area displays a math problem: 'The four finalists in the talent search will present their acts in the school talent show. Ms. King must decide which will be the first, second, third, and fourth acts in the show. In how many different ways can she arrange the four acts?'. Below the problem is a 'Break this problem into steps' button and a 'select one:' section with radio buttons for '16 ways', '18 ways', '24 ways', and '6 ways'. A 'Submit Answer' button is below the options. A red box highlights the problem text and the 'Break this problem into steps' button. Below the problem, a message says 'Sorry, that is incorrect. Let's move on and figure out why!'. The next question is 'How many elements do we have in the set?'. A hint is shown: 'How many finalists are going to present their acts in the talent show?' followed by 'There are 4 finalists.' A 'Show me the last hint' button is below the hint. The user's answer '24' is entered in a text box, and a 'Submit Answer' button is below it. The page footer says 'Terminado'.

Evaluación automática

(Automatic assessment)



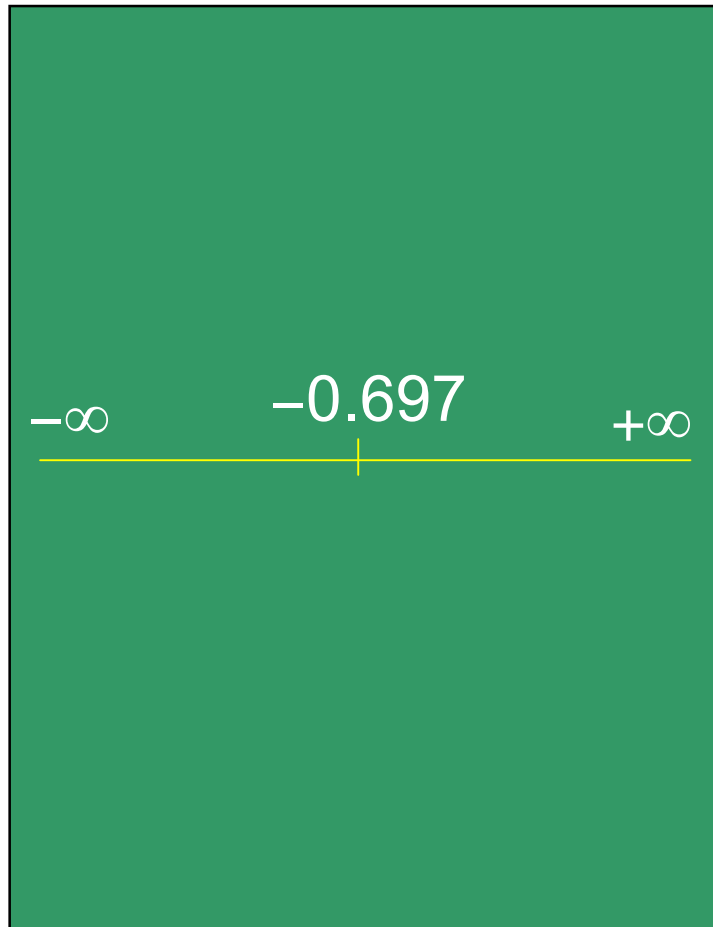
Inferencia

A double-lined arrow pointing to the left, labeled "Inferencia" (Inference).



Teoría de respuesta al ítem

(Item Response Theory)



Modelo de conocimiento

Inferencia

A black arrow with a double-line shaft, pointing from the right towards the left, indicating the direction of inference from student actions to the knowledge model.

A red rectangular box containing four screenshots of multiple-choice questions. Each screenshot shows the question text and the student's selected answer, indicated by a checkmark or an 'X' in a red box.

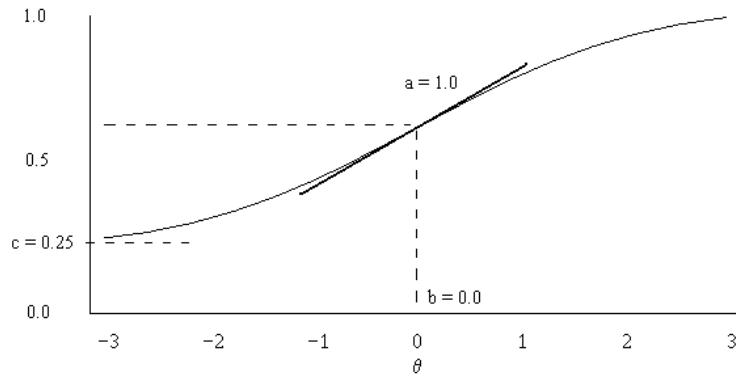
- Cuestión número 11:** "Cuál de los siguientes es el mayor inconveniente de la empresa individual." Student selected: "Dificultad para obtener recursos financieros." (checked).
- Cuestión número 12:** "Según el ejemplo de los violines y la orquesta, ¿de quién son los instrumentos para la doctrina liberal?" Student selected: "Del director." (checked).
- Cuestión número 11:** "Cuál de los siguientes es el mayor inconveniente de la empresa individual." Student selected: "Dificultad para obtener recursos financieros." (checked).
- Cuestión número 12:** "Según el ejemplo de los violines y la orquesta, ¿de quién son los instrumentos para la doctrina liberal?" Student selected: "Del director." (checked).
- Cuestión número 15:** "Una asociación de dos o más personas para formar una empresa es una." Student selected: "Sociedad." (checked).

Acciones del alumno

Teoría de respuesta al ítem

(Item Response Theory)

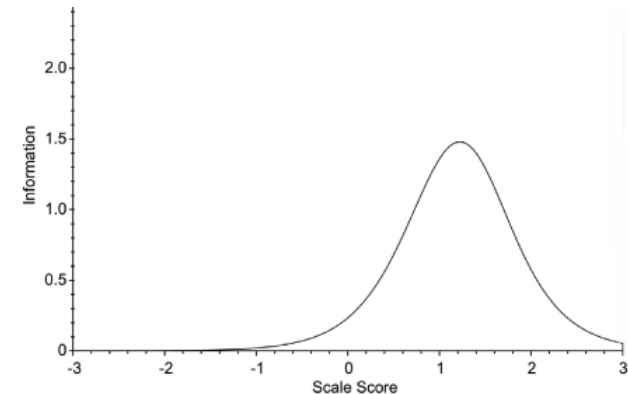
- Curva característica del ítem (pregunta)



$$p_i(\theta) = c_i + \frac{(1 - c_i)}{1 + e^{-a_i(\theta - b_i)}}$$

- Estimación del conocimiento y los parámetros de las curvas.

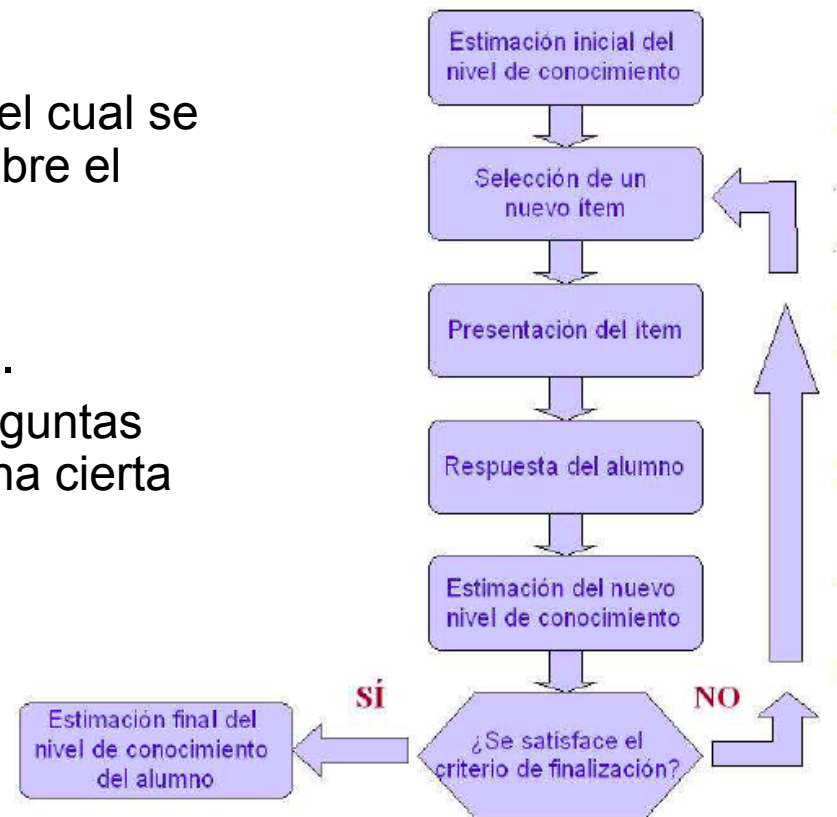
$$P(\theta | \mathbf{u}) = P(\theta | u_1 \dots u_n) = \frac{\prod_{i=1}^n P_i(\theta)^{u_i} (1 - P_i(\theta))^{(1-u_i)}}{\prod_{i=1}^n P(u_i)^{u_i} (1 - P(u_i))^{(1-u_i)}} P(\theta)$$

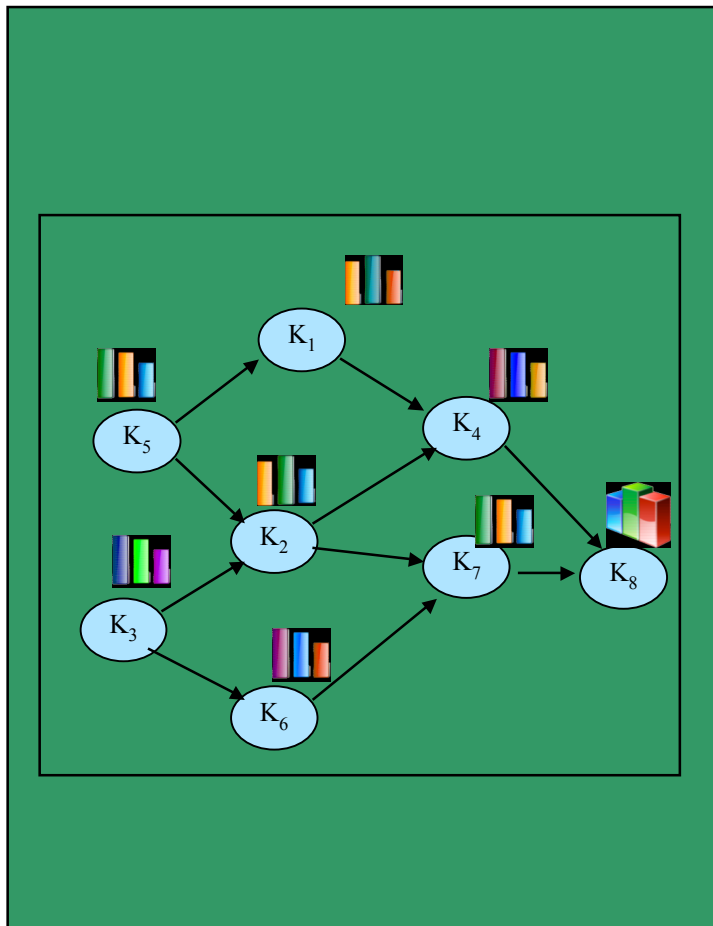


Tests adaptativos

(Computer Adaptive Testing)

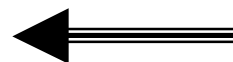
- Criterio de selección de ítems
 - Seleccionar el ítem a partir del cual se obtenga mas información sobre el conocimiento del alumno
- Criterio de finalización del test.
 - Determinar el número de preguntas suficientes para garantizar una cierta fiabilidad
- Control de exposición





Modelo de conocimiento

Inferencia



Acciones del alumno en un sistema de tutoría:

- Interfaz de pregunta: "¿Cuál de las siguientes fotografías corresponde a la especie Picea abies?" con cuatro opciones de imágenes de árboles.
- Interfaz de asociación: "Relaciona los eventos históricos ocurridos en el transcurso del siglo XX con el año en el que tuvieron lugar:" con una tabla de emparejamiento.

Inicio de la Primera Guerra Mundial	1969
Inicio de la Segunda Guerra Mundial	1914
Llegada del hombre a la Luna	1939
Inicio de la Guerra Civil Española	1936
- Interfaz de mapa: "Señalar sobre el mapa cual es la distribución geográfica de la especie Pinus nigra" con un mapa interactivo y una leyenda de colores (verde, azul, blanco) para áreas naturales, no naturales y en blanco. Botones: "Borrar todos", "Deshacer", "Mostrar/Ocultar referencias", "Corregir".

Acciones del alumno



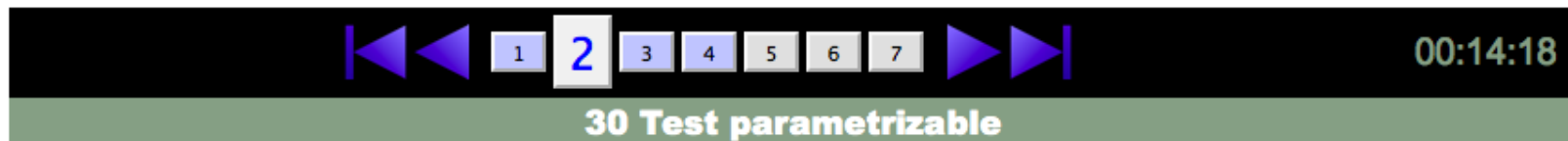
- Resultados de evaluación estructurados por temas/subtemas.

Tema	PC	PT	%	s100	Niv	Niv Graf.
UPM - EUIT Forestal - Botánica	587	937	62%	64,57	0,87	
+ Introducción	44	91	48%	42,13	-0,47	
No Vasculares	4	9	44%	61,11	0,67	
Pteridophyta	0	3	0%	0,00	-3,00	
- Pinophyta	213	289	73%	74,74	1,48	
Cycadaceae y Ginkgoaceae	4	4	100%	100,00	3,00	
+ Pinaceae	162	215	75%	75,89	1,55	
+ Cupressaceae	30	43	69%	70,54	1,23	
+ Taxodiaceae	3	5	60%	60,00	0,60	
+ Taxaceae	13	15	86%	90,00	2,40	
Gnetaceae	--	--	--	--	--	
- Ephedraceae	1	1	100%	100,00	3,00	
Ephedra	1	1	100%	100,00	3,00	
- Magnoliophyta	307	502	61%	64,68	0,88	
Magnoliaceae	1	1	100%	100,00	3,00	
Lauraceae	6	10	60%	53,34	0,20	
Coriariaceae	1	1	100%	100,00	3,00	
Berberidaceae	5	10	50%	50,00	0,00	
Cactaceae y Crass.	1	6	16%	22,22	-1,67	
Chenopodiaceae	0	4	0%	12,50	-2,25	
Caryophyllaceae	0	3	0%	0,00	-3,00	
Plumbaginaceae	1	3	33%	33,33	-1,00	

<http://www.siette.org>



- Control de navegación durante la realización del test. (atrás/adelante/reiniciar test)



Pregunta número 2:

Señalar las funciones que pueden representar ondas en una dimensión

$f(x,t) = x^2 - t$

$f(x,t) = \text{sen}(x^2 + 4t^2 - 4xt)$

Pregunta anterior

Siguiente pregunta

Finalizar test

<http://www.siette.org>



- Corrección automática de preguntas abiertas mediante distintos tipos de patrones de respuesta y reconocimiento de errores conceptuales.

¿Quien es el autor del Quijote?

- {{Don} Miguel {de}} Cervantes {Saavedra}
- {William} Shakespeare

Cual es la derivada de la funcion: $f(x) = x^2+2x$

2(x+1)

- $2\{^*\}x\{+2\}2\{+2\{^*\}x\{2\{^*\}\}((x\{+1\}x\{+1\})\}$

<http://www.siette.org>



- Extensible para soportar cualquier pregunta interactiva mediante Applets.

Asocia cada plato típico malagueño con sus ingredientes principales:

Gazpacho	■	agua
Porra	■	■ ajo
Migas	■	■ tomate
Ajoblanco	■	■ aceite
Gazpachuelo	■	■ pan
		■ almendras

distribución geográfica

Area natural
Area no natural
Area en blanco

Borrar todas
Deshacer
Mostrar/Ocultar referencias
Corregir

Area en verde 90.18 % Area en blanco 96.22 %

A map of Malaga, Spain, with a green area representing the distribution of typical Malagueño dishes. The map is overlaid with a grid and a legend.

Hallar la **derivada** de $y = \frac{1}{x^3}$

Edit Option

Formula

Aritmetica Funciones

$\frac{-3}{x^2}$

Domain loaded | Domain: New Domain | Syntax checking: Active

A screenshot of a web-based derivative calculator. The user has entered the function $y = \frac{1}{x^3}$ and the applet has calculated the derivative as $\frac{-3}{x^2}$. The interface includes a toolbar with mathematical symbols and a status bar at the bottom.

<http://www.siette.org>



- Generación automática de preguntas a partir de esquemas de preguntas.

- PHP
- JSP

```
¿Cuál es el valor de x al final de este programa? <BR><BR>
<?
  srand(date("U"));
  $randMax=getRandMax();
  $rand=Rand();
  $x =intval (doubleval ($rand) *doubleval (10) /doubleval ($randMax));
  echo "<CODE><PRE>";
  echo "    x=$x;<BR>";
  echo "    x++;";
  echo "</PRE></CODE>";
>
```

<? \$sol = \$x+\$x; echo \$sol; >	<? \$sol = \$x+1; echo \$sol; >	<? \$sol = \$x-1; echo \$sol; >	<? \$sol = \$x; echo \$sol; >
---------------------------------------	-------------------------------------	-------------------------------------	-----------------------------------

¿Cuál es el valor de x al final de este programa?

```
x=6;
x++;
```

12 7 5 6

<http://www.siette.org>

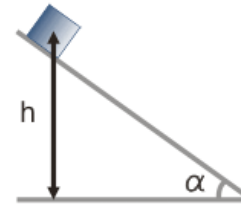


- Preguntas compuestas.

```
<%  
  int h = Random.nextInt(10,100,5);  
  int alfa = Random.nextInt(10,80,10);  
  double alfar = (double) 2* Math.PI * alfa / 360;  
  double g = 9.81;  
  double a = g * Math.sin(alfar);  
  double s = (double) h / Math.sin(alfar);  
  double t = Math.sqrt(2*s / a);  
  double v = Math.sqrt(2*g*h);  
%>  
Un solido se deja caer por un plano inclinado <%= alfa %>  
grados, sin rozamiento, en la superficie de la tierra desde una  
altura de <%= h %> metros  
<p/><center>  
<IMG SRC="/siette.htdocs/demo/images/PlanoInclinado.gif"  
ALIGN=top >  
</center>
```

Pregunta número 6:

Un solido se deja caer por un plano inclinado 60 grados, sin rozamiento, en la superficie de la tierra desde una altura de 60 metros



Pregunta número 6.1:

¿Que velocidad alcanza al llegar al suelo?

Pregunta número 6.2:

¿Que tiempo tarda en caer?

Pregunta anterior Siguiente pregunta Finalizar test

<http://www.siette.org>



- Diversos criterios de evaluación
 - Porcentual.
 - Por puntos.
 - TRI
 - Máxima verosimilitud.
 - Media de la distribución.

- Diversos criterios de finalización del test.
 - Por máximo de preguntas.
 - A petición de usuario.
 - Criterios adaptativos.

- Diversos criterios de selección de preguntas.
 - Aleatorio.
 - Aleatorio ponderado.
 - Ordenado.
 - Repaso espaciado. (Método Leitner)
 - Criterios Adaptativos.

<http://www.siette.org>



- Tests colaborativos

The screenshot shows a web browser window titled "SIETTE Colaborativo - Mozilla Firefox". The address bar shows the URL: <http://jupiter.lcc.uma.es/siette/colab/listaTests.jsp?sessionId=568F36D91C48271DB13D7D8FF20E>. The page content is divided into several sections:

- Status of the users:** A table showing the status of two users:

janedoe:	! discussion	Show answers
johndoe:	! discussion	Show answers

 A red circle with the number "2" is next to the "Show answers" buttons.
- (1) Awareness information:** A yellow box containing the text "(1) Awareness information".
- View all answers:** A blue button with a red circle and the number "3" next to it.
- Posts sent from the chat users:** A green box containing a chat log:
 - johndoe: Why did you answer that?
 - > janedoe: Because i think it is the correct answer
 - ! janedoe: If you take into account the horizontal axis defined by M-R, the object is not equally divided (you can calculate the area for the top part and check whether or not they are equal)
 - janedoe: Nevertheless, if you use the vertical axis, the area of both sections are equals
 - johndoe: I see
- Reply to:** A text input field containing "I think it is correct".
- (4) Communication tool:** A green box containing a "Reply to:" field and a "Justification" field.

The main content area displays the "SIETTE Geometry" interface. It shows "Individual mode" for user "Jane Doe". The question is "Individual answer to question 4": "Which 2 points would both be on the line of symmetry for the shaded figure shown on the grid below?". The grid shows a shaded trapezoid with vertices labeled M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z. A "Solve it" button is at the bottom of the question area. The user's answer "W,X" is visible in the input field below the grid.

<http://www.siette.org>

Conferencias



- AIED - Artificial Intelligence in Education. (Christchurch, Nueva Zelanda, 2011)



- UMAP - User Modelling, Adaptation and Personalization. (Gerona, España, 2011)



- ITS - Intelligent Tutoring System (--- 2012)



- ICALT - International Conference on Advanced Learning Technologies. (Georgia, USA, 2011)



- CSCL - Computer Supported Collaborative Learning. (Hong-Kong, China, 2011)

Revistas



- International Journal of Artificial Intelligence in Education



- User Modelling and User Adaptive Interfaces



- Computer & Education



- IEEE Transactions in Education



- Journal of Engineering Education