DESIGN, DEVELOPMENT AND REUSE OF PEDAGOGICALLY SOUND LEARNING OBJECTS

Centre for Information Technology in Education

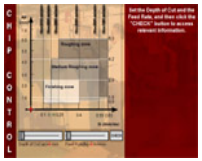
CITE Seminar Presentation

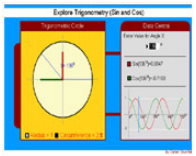
1st April 2005

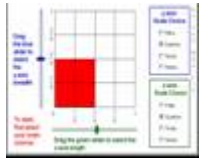
FROM LAST PRESENTATION

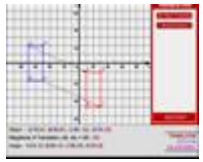
What is a Better Learning Object

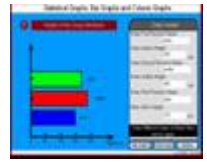
A Better Learning Objects -- My Examples

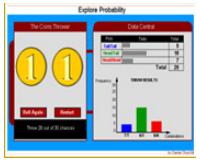


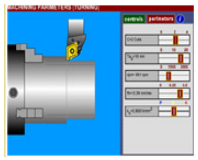


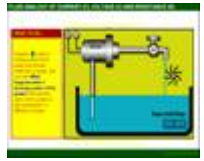


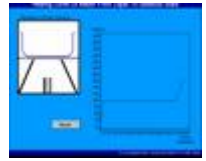


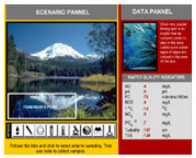


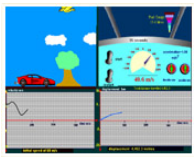


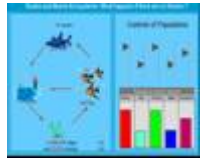
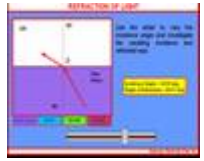


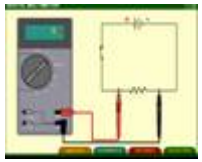


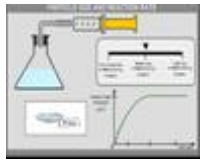


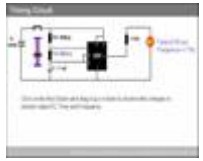
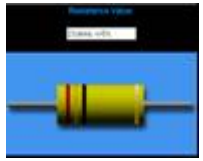


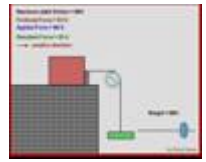
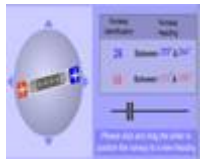


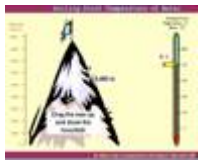
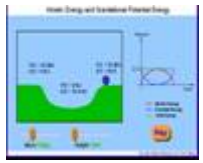
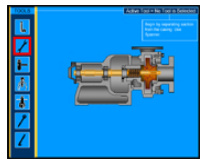







VISUALIZATION

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INTERACTIVITY

Classification of LO -- Objective Analysis

- **Information Objects**
  - Representation of information e.g., illustrations, networks, diagrams, visual interfaces for information mining, cases, etc
- **Conceptual Models**
  - Representation of conceptual resources of a subject matter expert
- **Contextual Representations**
  - Representation of an environment which allows learners to collect authentic data which can be used for experiments , investigations, problem solving, etc
- **Simulation Objects**
  - Represent real tool and system
- **Practice Objects**
  - Representation that allow practice
- **Presentation Object**
  - Various instructional sequences such as recorded presentations, demonstrations, electronic tutorials

DESIGNING AND DEVELOPING LOs

What is an effective strategy for creation of dynamic collection of Learning Objects?

Locating Tools

- Strategy that expects teachers/instructors to develop learning objects is problematic
- Teachers must focus on planning of activities, building of learning environments and facilitation of learning
- We need a library of learning objects
- Collaborative human activity between teachers, subject matter experts and software people is needed to quickly populate library with pedagogically sound learning objects

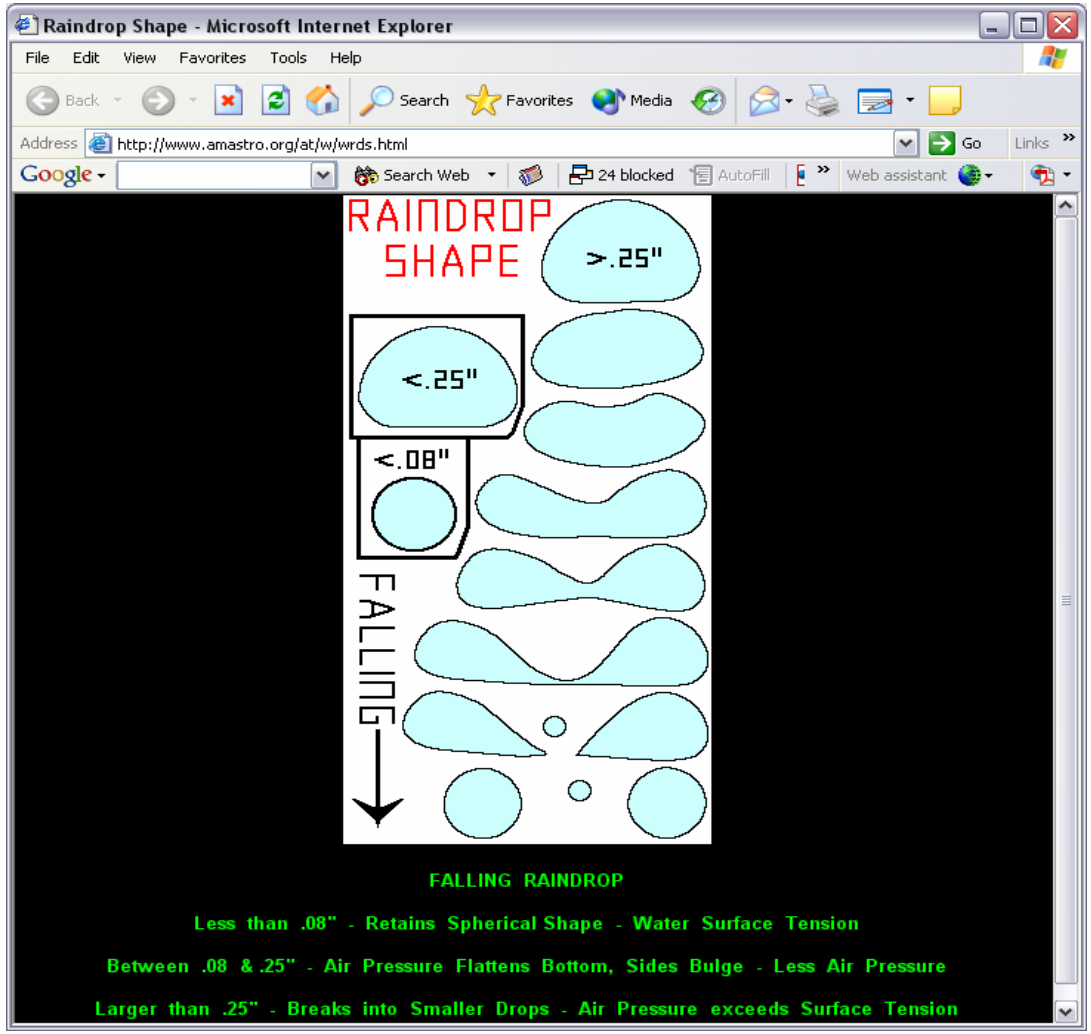
Designing Learning Objects

- Conducting analysis of information
- Observing real system or object and creating a representation of it
- Identifying source of useful data and creating context for data collection
- Examining own cognitive resources (knowledge) and attempting to externalize them
- **Unlike other professionals, e.g. journalists, as designers we must keep in mind how will LO be used and how will learners learn**

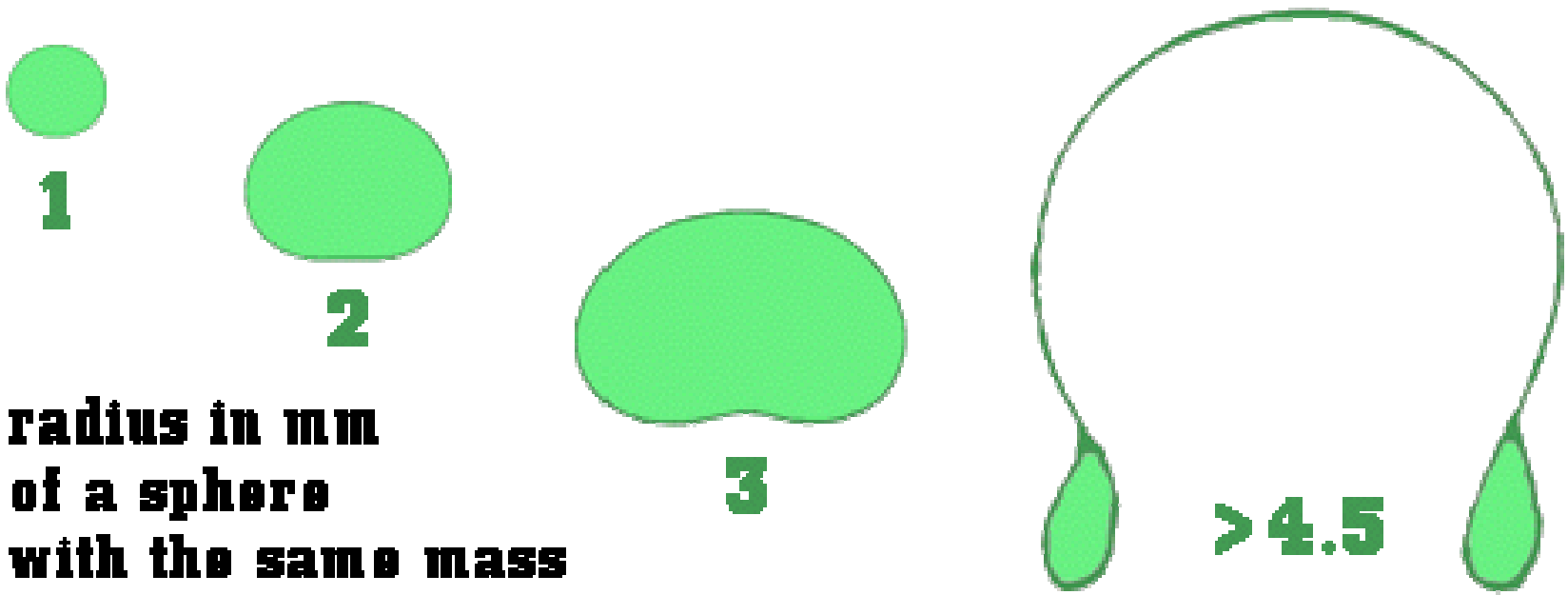
Example of an Inquiry

Is this a shape of a rain drop?

Can you trust Information from the Internet?

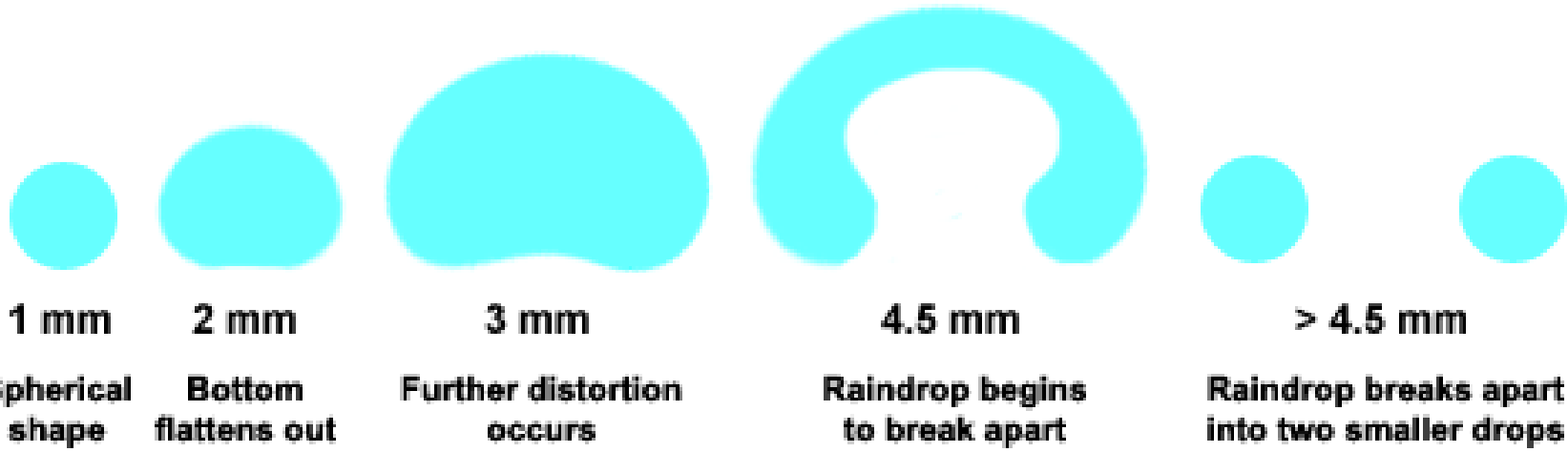


http://www.amastro.org/at/w/wrds.html



radius in mm
of a sphere
with the same mass

http://fraser.cc



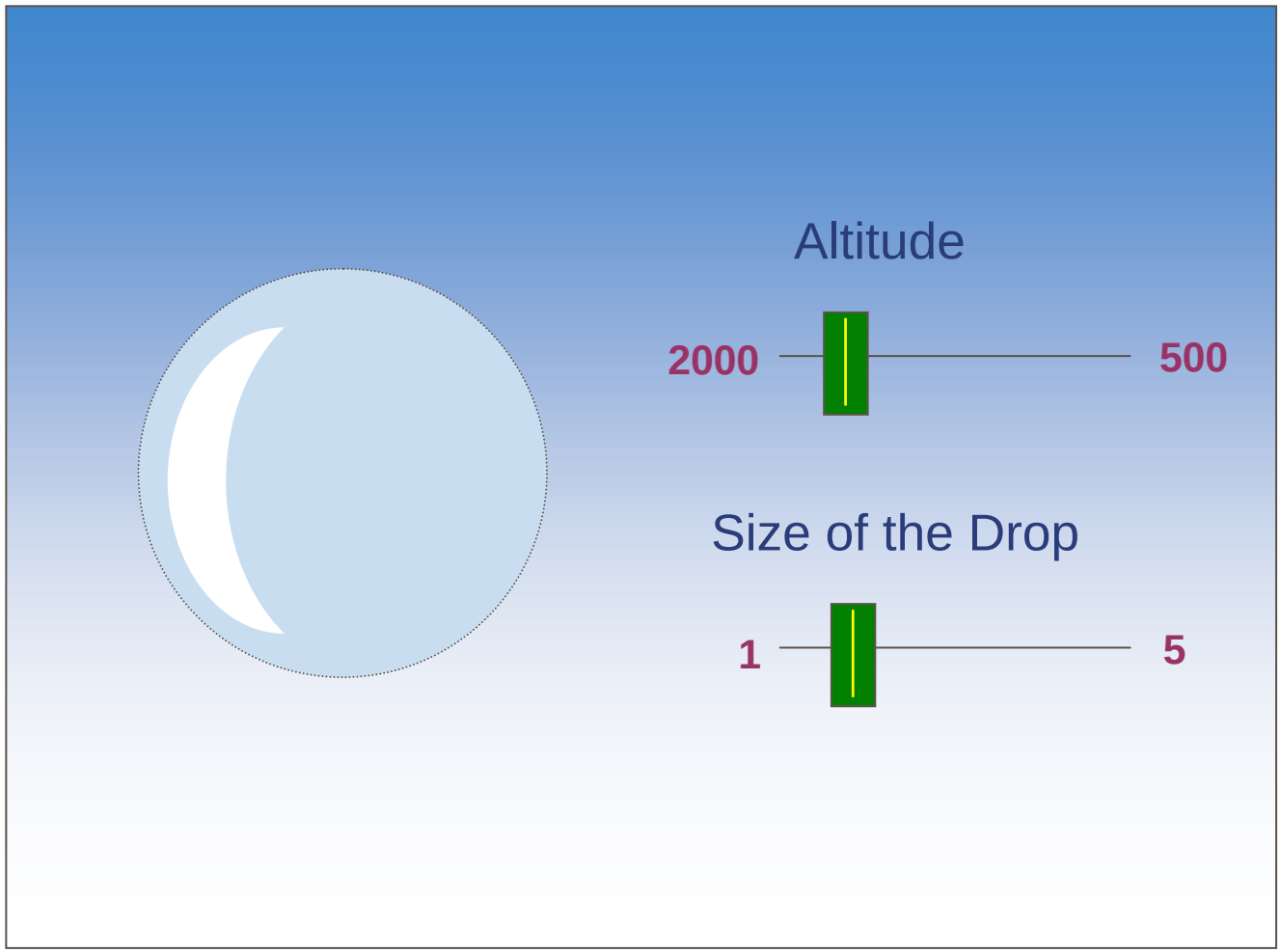
http://www.stormcenter.com/envirocast/2003-04-01/envirocast-article2.php

Variety of Factors

- Air Resistance
- Gravity
- Velocity
- Size
- Angle
- Wind and angle
- Air Pressure and Surface Tension
- Aero-dynamic forces

Parameters

Information



Interactivity

Input Level	Process level	Output level
➔ *Physical Interaction with screen elements: Buttons, Pull-down Menus, Check Boxes, Text Entrees, Drag & Drop, Sliders,* ➔ *Haptic devices* ➔ *Biometrics* ➔ *Social Interaction* ➔ *Brain-Machine Interfacing (This is distant possibility)*	➔ *Manipulating numerical data* ➔ *Manipulating strings of data (text)* ➔ *Logical operators* ➔ *Data-mining and artificial intelligence*	➔ *Text and numbers* ➔ *Diagrams and graphs* ➔ *Images and drawings* ➔ *3D models and QTVR* ➔ *Video and Animation* ➔ *Audio*

How interactivity changes with mobile devices and HDTV?

Technology Tools

- Flash is probably the best option
- Authorware is another option
- Tools are becoming easy for development of learning objects and other forms of computer-based representations:
  - Captivate and CamptAsia
  - Xcelsius
  - Interactive Physics

Voltage

1

Resistance

1

Current

1.0000

Click this Button for more learning objects

Learnactivity

Product Price

YR Sale 2005

$12,000.00
$9,025.00
$6,050.00
$3,075.00
$100.00

Amount

1000

Manufacturing
Packaging
Marketing
Transportation
Tax

Cost Category

Manufacturing	1000
Packaging	200
Marketing	300
Transportation	150
Tax	330

Maufacturing Manufa 1000

Manufacturing

1000

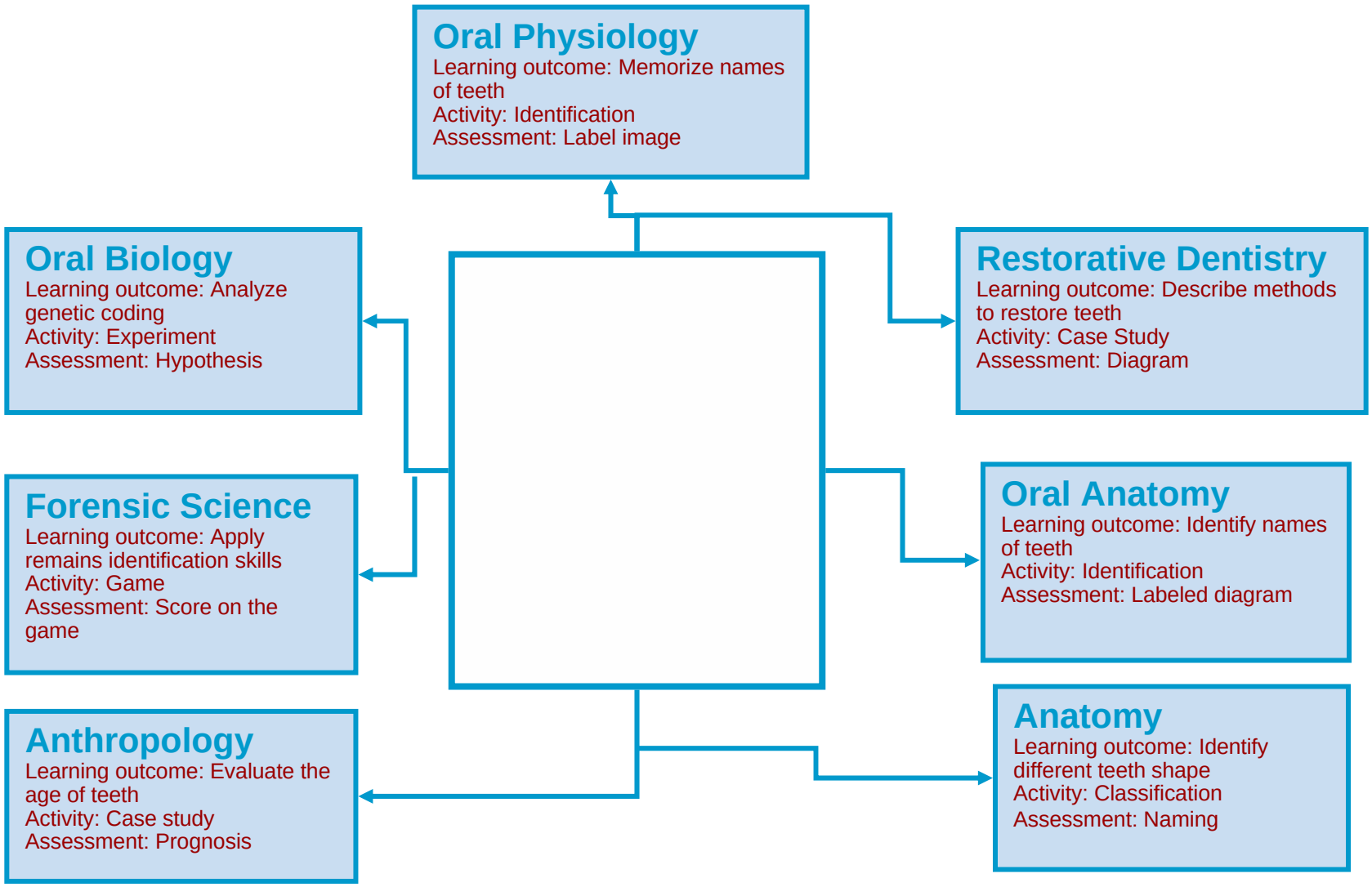
Created With Xcelsius
Patent Pending

Trial Version

REUSE OF LOs

How can you maximize reuse of Learning Objects?

Simplistic View of Reusability

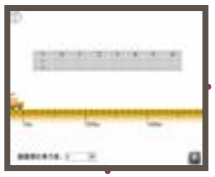
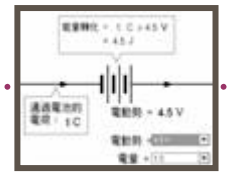


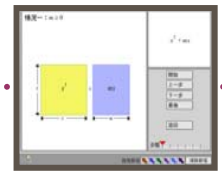
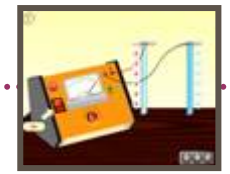
QTVR by Hans Nyberg http://www.panoramas.dk/ Metadata from John Hedberg

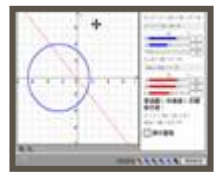
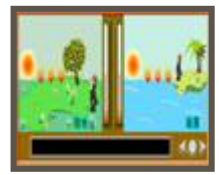
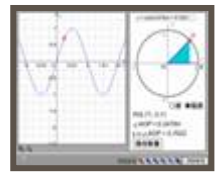
Broader Context for Reuse

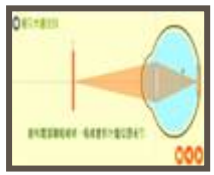
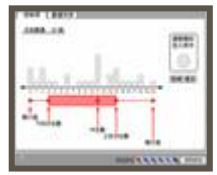
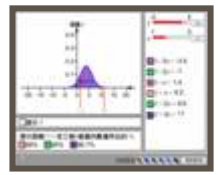
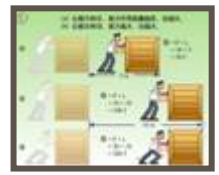
- Different Students
- Different Teachers
- Different Learning Objectives, Topics, Courses
- Different Kinds of Activities
- Different Activities
- Different Difficulty Level of an Activity
- Different Situations
- Different Mode of Delivery
- Developing other Learning Objects
- …

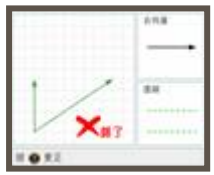
Let's Look at Some of Local Objects

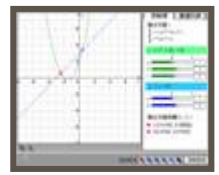







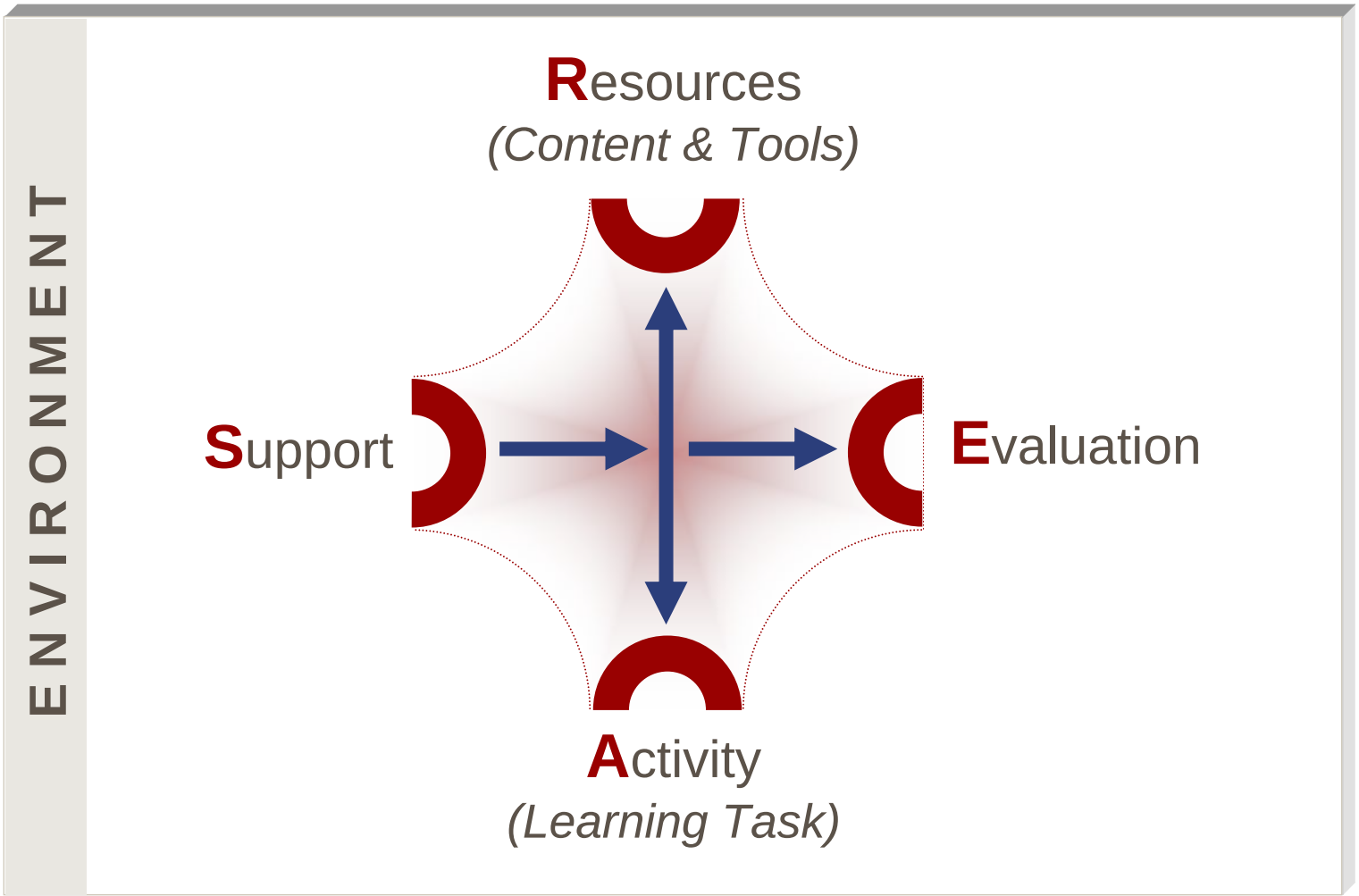
Hanlun Information

- Library of learning objects should:
  - Allow search to locate a learning object;
  - Allow preview of a learning object;
  - Provide heuristics for pedagogical use of a learning object;
  - Provide reviews from other teachers about this leaning object;
  - Recommend related learning objects;
  - Keep search histories and inform a teacher about similar searchers and objects selected by other teachers, and
  - Keep record and analyze a teacher's searching pattern in order to recommend certain learning objects

Different Analysis

- What are the key components of an effective learning environment?
- Can these components be separated?
- What kind of component is a Learning Object?
- What is the effective use of technology for each component and for the learning environment as a whole?
- **Can we put these components together once we separate them?**

Key Component -- "RASE" Model



E-learning Environment

➔ Resources

- Content (Psychological tools) --
  - E.g., PDF Documents, Video and Audio Clips, PowerPoint slides, Audio clips and all kind of Learning Objects,..
- Tools (Technical Tools)
  - E.g., MS Word, MindManager…

➔ Activity (Learning Task)

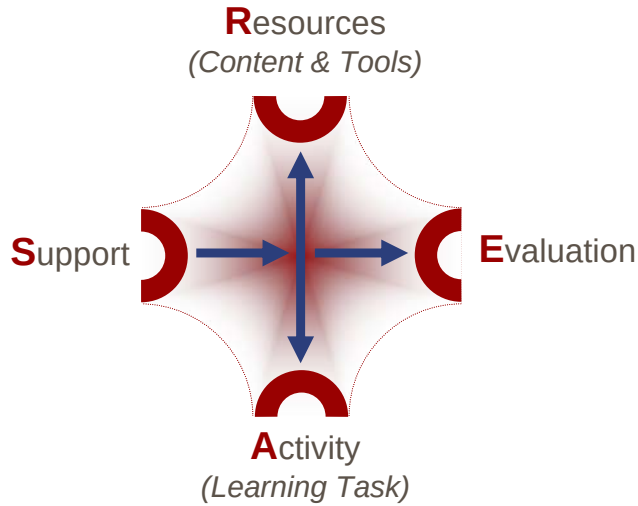
- Problem-solving, Inquiries

➔ Support

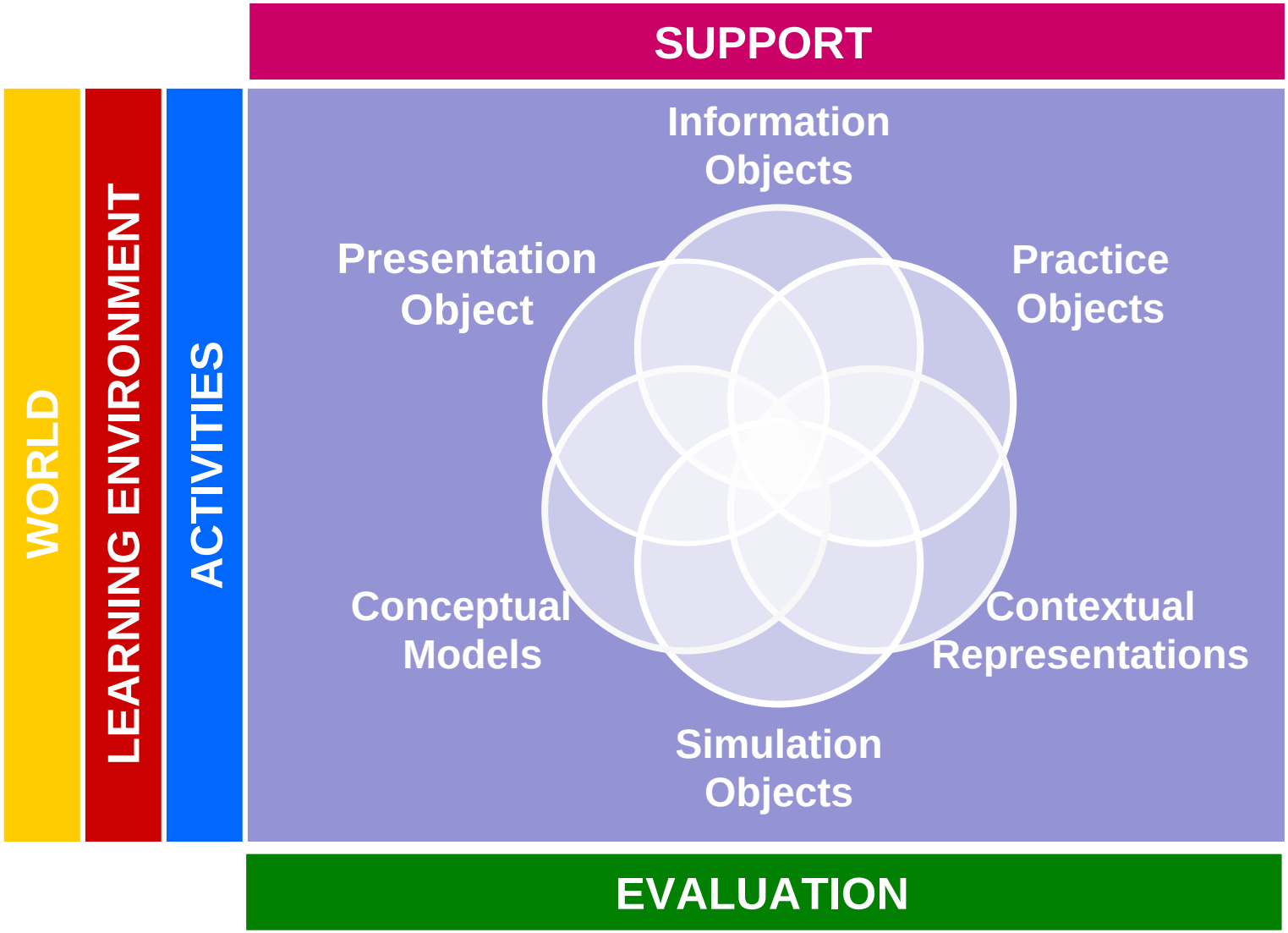
- Prescriptive
  - Instructions, FAQ, On-line Help, What-to-Do Strategies, Extra Resources, Self Check (Drill & Practice)
- Just-in-time/ On-demand
  - Discussion Board, Email, Chat,

➔ Evaluation

- It should be integrated with Activity
- Digital Portfolios



LO in a Learning Activity



The Future is Mobile

- Ericsson and Nokia tell us that there are 1.500.000.000 mobile phones in the world today. The world's population is 6 billion.
- The number of mobile subscribers in China alone is 200.000.000. This number is increasing at a rate of 2.000.000 per month.
- More that 525.000.000 web-enabled phones were shipped in 2003.
- There will be more than 1.000.000.000 wireless internet subscribers in 2005.

Source: Desmond Keegan, D. Mobile Learning-The Next Generation of Learning. Presentations at the 18th Annual Conference of the Asian Association of Open Universities, Shanghai, 28-30 November 2004

Organizing Learning Environments

- Simple Web Page
- Within a LMS (Blackboard)
- WebQuest
- ActiveLesson
- QuestAtlantis

- Multiplication of Fractions
- Learning Theories WebQuest
- Photosynthesis
- Air Pollution
- Drying Rate
- Light and Shadow
- Perspectives
- Magnetic Field

For Information

- I am preparing a very interesting strategy **ActiveLessons** (Generation III MicroLessons)
  - Some Examples:
    - Time Management
    - Sort Your Clothes
    - Three Little Pigs
    - Suspicious Substances
    - Tarzan and His Animals
    - Fermented Food
    - La Mer Town
    - Family Three
    - The Truth and Nothing but the Truth

Conclusion

- A Better Learning object as an interactive visual representation of data, information, ideas and cognitive resources
- Information Objects, Conceptual Models, Contextual Representations, Simulations Object, Practice Objects and Presentation Object
- Activity is essential for learning to take place and for the tools to be an "***instrument"*** of an activity

About the Presenter

- *The only limits in the future will be designers' imagination*
  ~ Ultimate Machines, Discovery Channel

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