# Improving participation and critical thinking of students using LAMS

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# Purpose

▸ LAMS is an easy and intuitive interface

▸ Authoring activities based on social and constructivist theories of learning intimidates

● Cognitive Skill–based question Wizard

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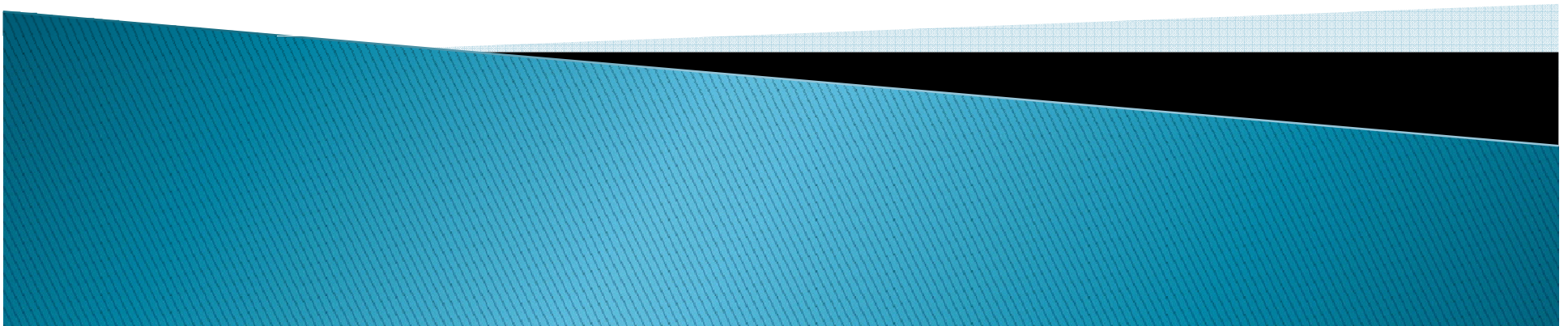University of Cadiz, Spain July 26th.

# Overview

1. Introduction

2. Theoretical Framework

3. The Cognitive Skills Questionnaire Wizard

4. Implementing CSQ-Wizard in LAMS

5. Conclusions

# Introduction

Learning Design & online learning

# Introduction

- Participation and critical thinking are major issues in education.
- "*...learners construct knowledge in a social context as they try to make sense of it, continually modifying prior knowledge as they apply it to new contexts*" (Social constructivism - Vygotsky, 1978.
- Teachers have difficulty applying them in the classroom.
- This is the problem faced and by Computer Science students at the Hellenic Open University.

# Survey – Data Collection

- Twenty–eight (28) **Computer Science** 4–year degree **students**
- Hellenic Open University
- Academic year: 2006–2007
- Thematic unit (3–semester course):  **Computers and Education**
- Task: **Designing courses for Computer Science concepts**

# Approaches to Learning Design

| Activity | f | f% |
|---|---|---|
| I : *Providing verbal information - task description* | 304 | 35% |
| Q : *Asking questions* | 323 | 37% |
| P : *Displaying solutions of similar tasks* | 40 | 5% |
| R : *Running a program* | 36 | 4% |
| M : *Providing with learning materials to interact* | 86 | 10% |
| E : *Demonstrating solutions of simple examples* | 14 | 2% |
| T : *Presenting necessary theoretical information* | 16 | 2% |
| A : *Active participation & construction of a solution* | 22 | 3% |
| G : *Encouraging group work* | 28 | 3% |
| Ro: *Assigning roles in groups* | 2 | 0% |
| F : *Participating in forums* | 2 | 0% |
| C : *Constructing a problem* | 2 | 0% |
| *Total* | *875* | *100%* |

# Theoretical Framework

Traditional vs. Modern Education
and online learning

# Traditional behaviorist learning theories

- Emphasize (*Skinner, 1968*):
  - the impressive presentation of the learning content
  - 'drill and practice' activities
  - the teacher-telling approach
  - learners as listeners
- As a result, learning becomes a meaningless activity for students, mainly utilizing their memorizing skills and not their cognitive skills

# Modern constructivist and social learning perspectives

- **Learning** as an active, constructive and subjective activity
- **Students** at the center of the learning process
- The role of appropriate **tasks, learning activities** and **questions** is crucial in motivating learners to be active
- holistic, real life learning tasks, problem-solving, open and multiple-answers questions

*(von Glasersfeld, 1987; Vygotsky, 1978; CTGV, 1992; Noss & Hoyles, 1996; Nardi, 1996; Jonassen, 2000)*

# Critical thinking

- a process that allows people to gain new knowledge through problem solving and collaboration
- focuses on the process of learning than just attaining information, involving discovering how to analyze, synthesize, judge and create-apply new knowledge to real-world situations *(Walker, 2005)*

Teachers can improve student critical thinking by helping them to develop **all** their cognitive skills

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# Cognitive Skills

▸ … include any mental abilities and skills that are used to think, study, and learn in the process of acquiring knowledge;

▸ these skills include reasoning, perception, and intuition.

▸ Bloom's taxonomy (1956) serves as the basis for what are now called *higher order thinking skills*

# Bloom's levels of cognitive skills

- The development of cognitive skills is a **difficult issue.**
- Teachers require more **specific support** in their learning design practices.

- Specific tools and good examples of lesson plans

**Products**

events, diary, collection, television, puzzle, diagram, radio, people, photographs, newspapers, books, sculpture, magazines, tapes, diorama, map, diagrams, models, scrapbook, records, films, stitchery, filmstrips, mobile, model, recommendation, illustration, letter, graph, group discussion, survey, panel, questionnaire, news item, commercial, court trial, report, survey, diagram, conclusion, chart, value, self-evaluation, story, poem, play, pantomime, song, cartoon, advertisement, structure, invention, news article, magazine, recipe, new color, smell, taste, machine, TV, radio show, new game, product, puppet show

**Activities**

ask, list, match, construct, discover, teach, paint, sketch, manipulate, interview, identify, listen, record, experiment, research, locate, report, observe, stimulate, evaluate, classify, judge, categorize, debate, separate, discuss, compare, editorialize, dissect, decide, contrast, recommend, combine, invent, advertise, choose, compose, survey, hypothesize, predict, role-play, estimate, infer, produce, imagine, write

Remember/Understand, Apply, Evaluate, Analyze, Create

*Clark, B. (2002)*

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# Constructivist design emphasizes ...



- the fundamental concepts of the learning subject in question and not its details
- **Group work** is also crucial in encouraging learning through participants' sharing of knowledge.
- It is worth noting that, when such **activities** can be combined with appropriately posed **questions**, they will become powerful learning tools

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# The *Cognitive Skill-based* Questionnaire Wizard
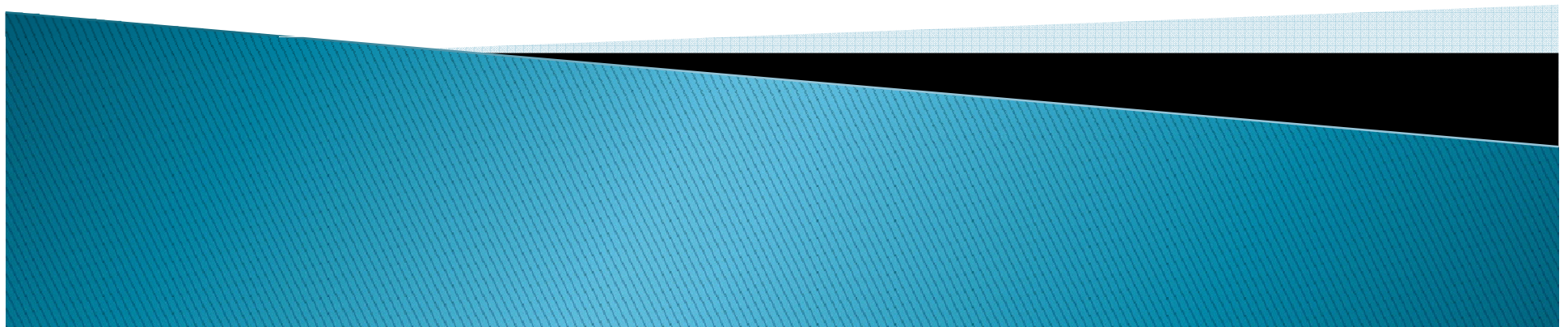
# Questions play a crucial role in ...

▸ Cognitive skills
▸ "Design Thinking"
▸ Critical and Higher Level of Thinking

*(Sanders, 1966; Flanders, 1970; Dym & Little, 2003)*

▸ Teacher encouragement and support  for creating 'questions' is essential

# Questions help students to ...

- analyze, synthesize, and evaluate ideas and information
- achieve educational, professional, and personal objectives
- demonstrate sensitivity to and respect for others and participate actively in group decision making

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# Tools to support web-based education

a) Communication

b) Content Presentation,

c) Learning Organization,

d) Learning Assessment,

e) Tools to design learning activities

> Tools that support teachers in constructivist task – questions design have not yet been reported

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# Critical thinking & Cognitive skills

A. Data collection skills

B. Data organization skills

C. Data analysis skills

D. Data transcendence skills

# Basic groups of Cognitive skills 1/3

*A) Data collection skills*:
    A1: *Observation*
    A2: *Recognition*
    A3: *Recall*

*B) Data organization skills*:
    B4: *Comparison*
    B5: *Classification*
    B6: *Ordering*
    B7: *Hierarchy*

# Basic groups of Cognitive skills 2/3

**C) Data analysis skills:**

C8:      Analysis

C9:      Recognition of Relationships

C10:    Pattern recognition

C11:    Separation of facts from opinions

C12:    Clarification

# Basic groups of Cognitive skills 3/3

## D) Data transcendence *skills* :

D13: *Explanation*
D14: *Prediction*
D15: *Forming Hypotheses*
D16: *Conclusion*
D17: *Validation*
D18: *Error detection*
D19: *Implementation-Improvement*
D20: *Knowledge organization*
D21: *Summary*
D22: *Empathy*
D23: *Assessment /Evaluation*
D24: *Reflection*

# The Implemention of CSQ-Wizard in LAMS

Cognitive Skill based Questionnaire Wizard

# LAMS Authoring Tools

▸ Q and A
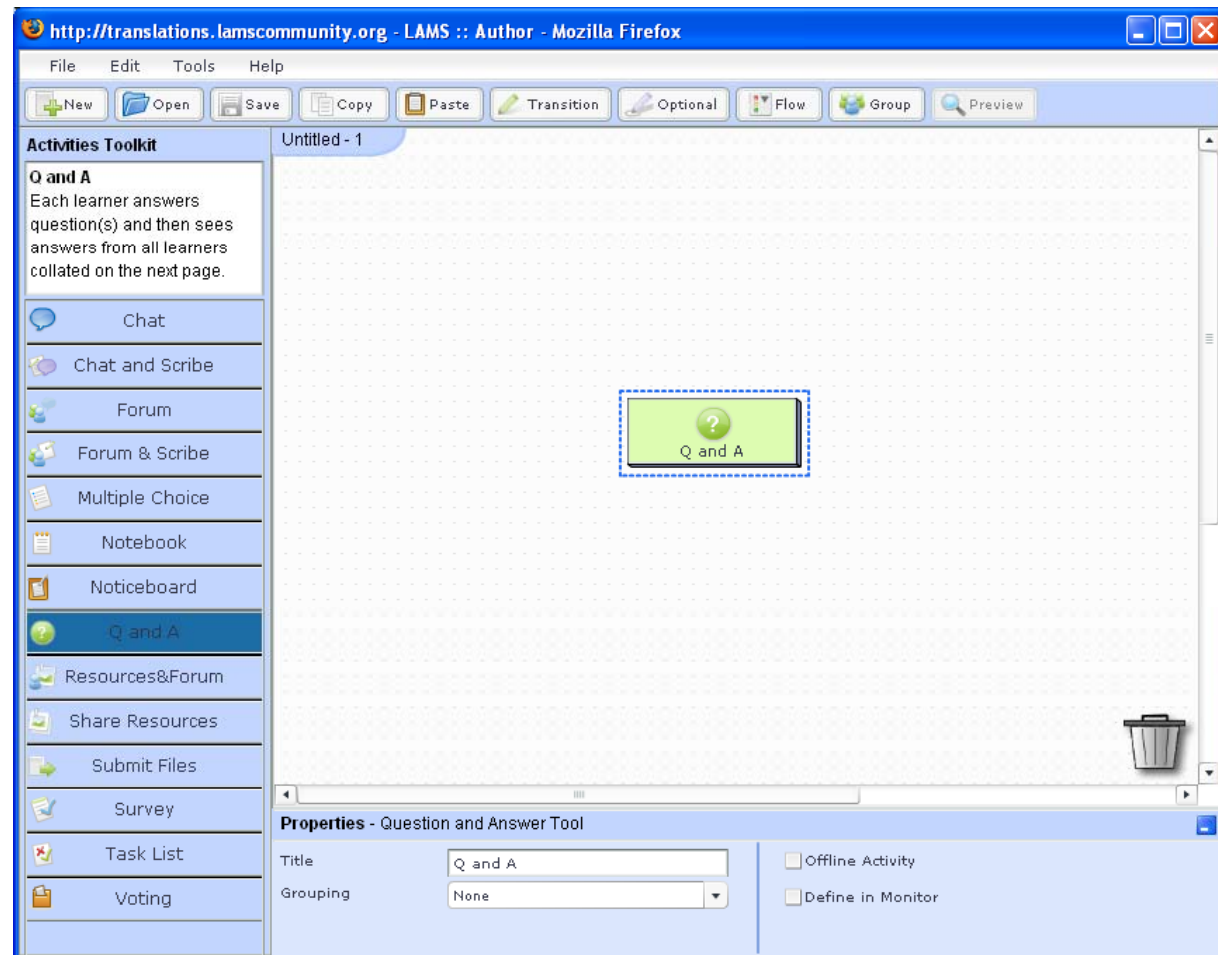
# LAMS: Q and A tool

- Question Assistance

# Cognitive Skills Questions Wizard

- CS Q–Wizard

# Cognitive Skills menu

▶ Cognitive Skills Selection

# Samples model questions

- Select a stem question
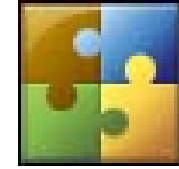
# Creating questions

► Appending the question into the Question text area
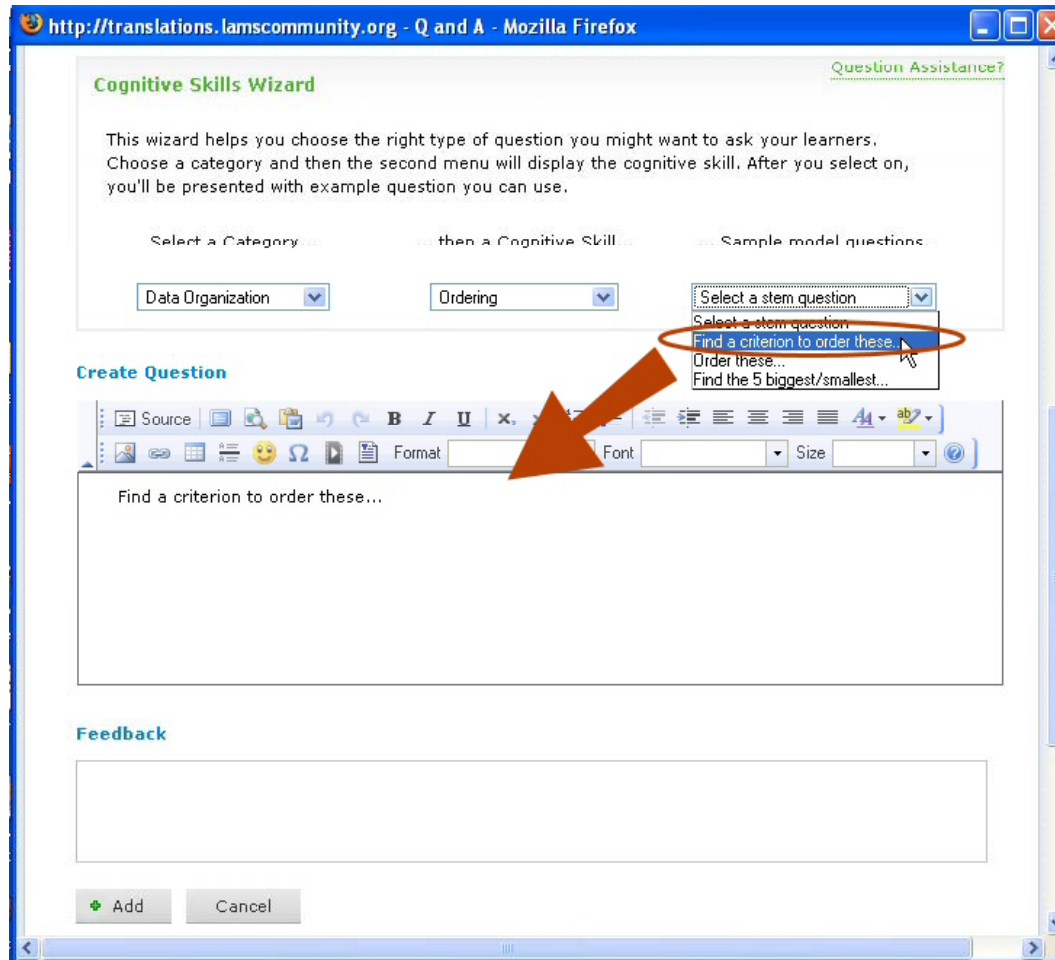
Conclusions and future plans
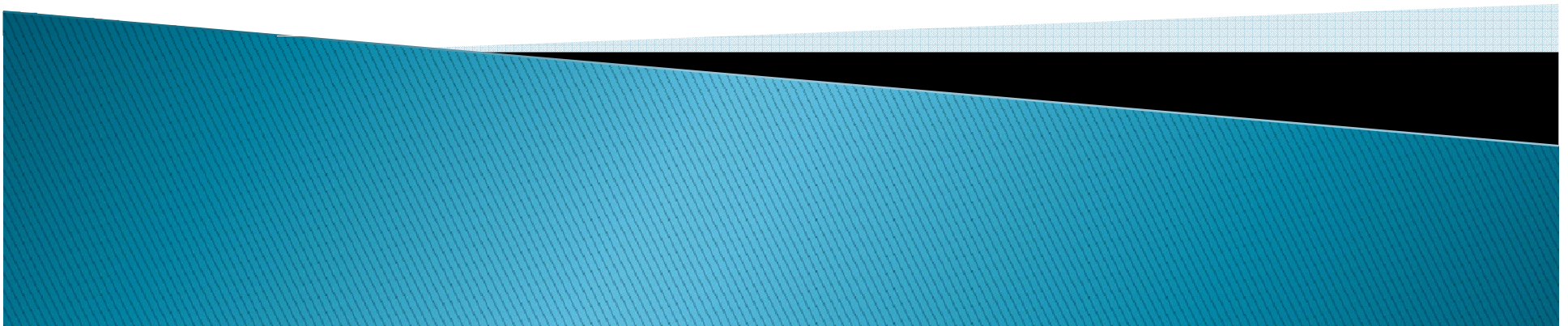
# Conclusions

- How a cognitive skill-based question wizard might assist teachers to create better assessment learning activities in LAMS
- The wizard can enhance their attempts to design appropriate lesson plans and encourage the development of cognitive skills in learners
- Wizards is a new concept for LAMS

# Future plans

▸ New Wizards to other LAMS tools

▸ Evaluation of CSQ-Wizards usages in action

# Thanks

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# Questions



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