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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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
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

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# Approaches to Learning Design

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

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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

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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

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

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.
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
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 Implementation of CSQ–Wizard in LAMS

Cognitive Skill based Questionnaire Wizard
LAMS Authoring Tools

- Q and A

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LAMS: Q and A tool

- Question Assistance

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Cognitive Skills Questions Wizard

- CS Q- Wizard

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Cognitive Skills menu

- Cognitive Skills Selection

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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

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Future plans

- New Wizards to other LAMS tools
- Evaluation of CSQ–Wizards usages in action
Thanks

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Questions