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# Using SCORM for Interactive Teaching in Higher Education

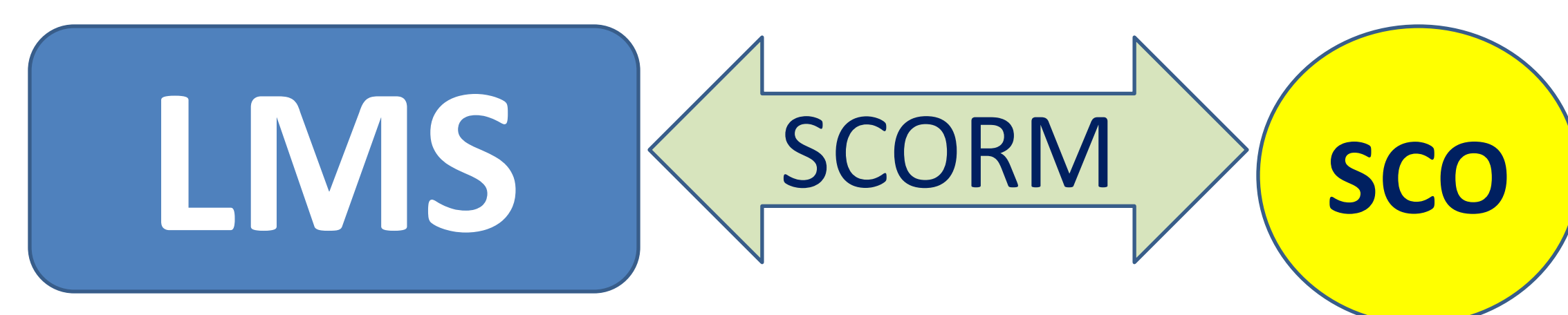
Reinhold Behringer, Sue Curland  
Leeds Metropolitan University

Andreas Holzinger  
Medical University Graz

## The SCORM Standard

SCORM = Sharable Content Object Reference Model. This standard regulates the communication between a Sharable Content Object (SCO) and a Learning Management System (LMS) [1].

It relies on JavaScript (user interface) and XML (metadata and content description).



## SCORM-Compliant Learning Delivery

### Advantages

The learner only needs a web browser with JavaScript.

- SCOs can be interactive and can provide individualised learning.
- Learning progress can be monitored by teacher.
- Marking can be done automatically.

### Problems

- Integration with LMS can suffer from technical connection problems.
- Limited complexity of SCO due to constraints of web-based delivery.
- Deliver on Smartphones needs extra care regarding formatting and usability.

## Authoring

At LeedsMet we have used the free software COURSELAB [2] to author and edit our SCOs. This allowed to create embedded SCOs which are linked within a LMS, and also stand-alone SCOs for off-line access.



Fig.1. Authoring of SCOs by the tutor.

## VMC-Graz Case Study:

Medical University of Graz has implemented the "Virtual Medical Campus" (VMC). This complements real lectures by providing additional material. Each SCO contains 4 elements as shown in Fig.2.

### Results

- Teachers had reservations about creating pre-knowledge questions.
- Students appreciated the self-assessment questions.

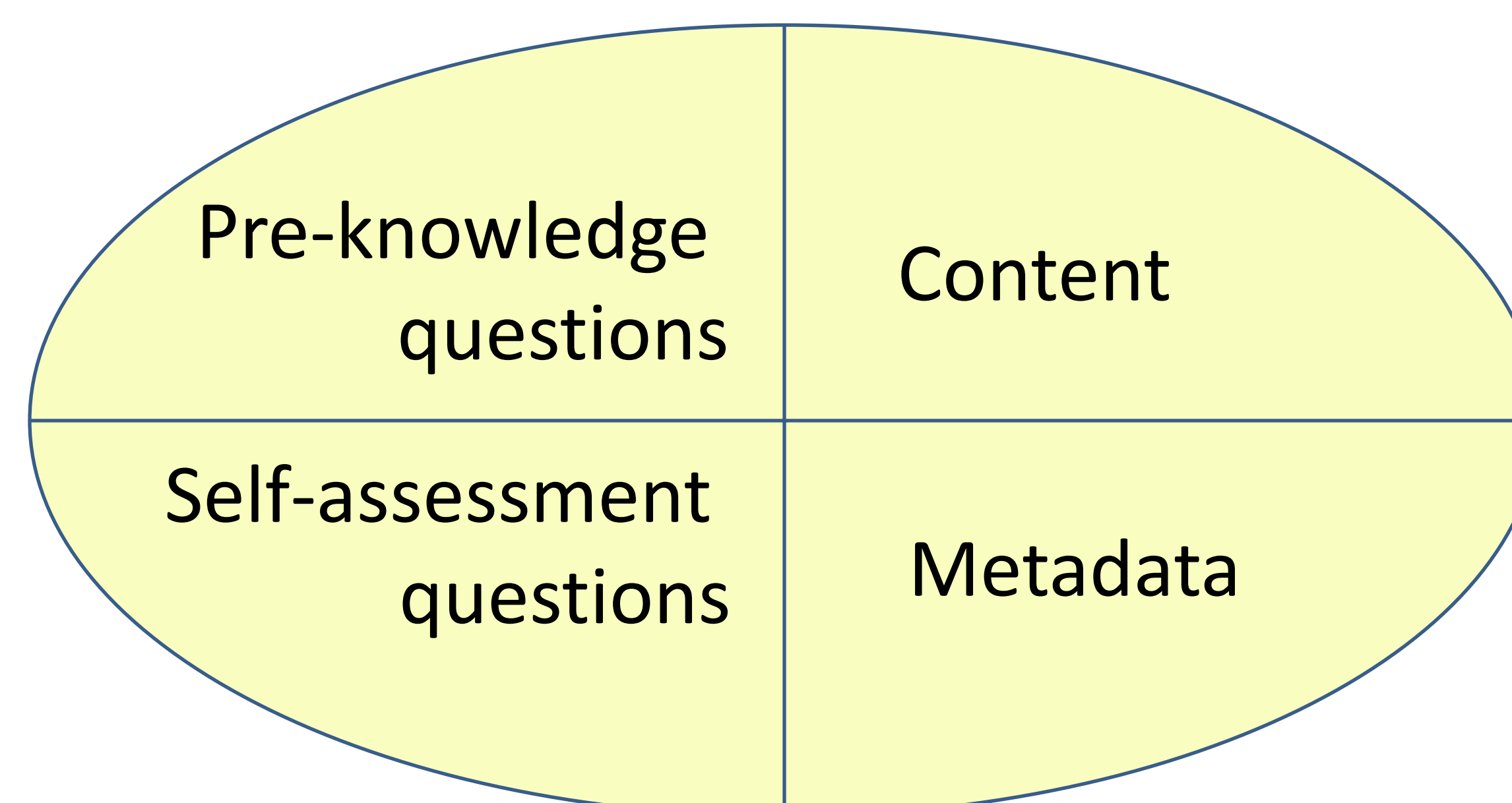


Fig.2. Four elements of a VMC-Graz SCO [3].

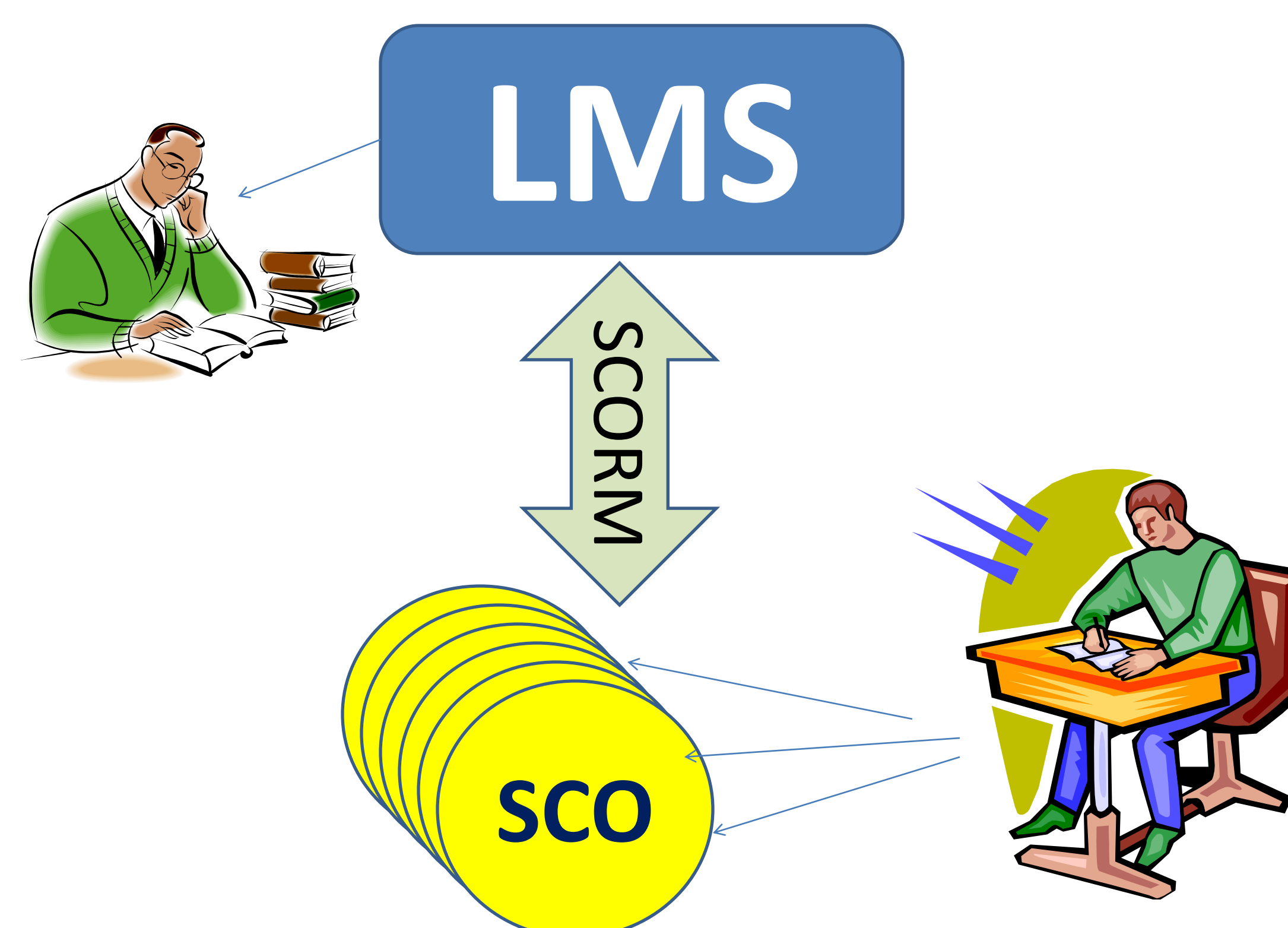


Fig.3. Students' engagement with SCOs .

## LMU Case Study 1: Student Numeracy

This case study involved an initial test of numeracy capabilities (pre-knowledge questions) of 50 first year business / finance students. 20 interactive problems were given to students as an SCO. Through JavaScript randomisation of parameters, each student received a unique problem.

The problems were classified into a set of categories, and at the end the students could see their strengths and weaknesses.

### Results

- Overall positive acceptance of the SCO.
- Limitations of SCORM 1.2 prevented hosting on LMS, could only be used in stand-alone mode.

## LMU Case Study 2: Quizzes in MSc Module

This case study involved a cohort of 48 Master students on the module "Mobile and Wireless Comms". During the semester, each tutorial was accompanied by one SCORM quiz (self-assessment). The quizzes were problems with random numeric parameters, which required the application of an equation or formula. An example was given to the students so as to practise the operation of the SCO. Fig.3 shows the principle of hosted SCO delivery.

### Results

- Students became very engaged in working on the quizzes.
- Most students solved the quizzes ok.
- Is suitable as a component of marking, to measure student engagement and to improve learning.
- Problems with stability of connection to LMS caused disruption of the feedback to LMS, hence some scores were not recorded properly. Solution: within SCO embed other methods for feedback as fallback option (e.g.. automated email).

## References

1. SCORM. <http://www.adlnet.gov/Technologies/scorm/default.aspx>
2. CourseLab. <http://www.courselab.com/>
3. Holzinger, A., Smolle, J. & Reibnegger, G. (2005). LOs (LO): An Object Oriented Approach to Manage e-Learning Content. In: Lazakidou, A. (Ed.): Informatics in Healthcare & Biomedicine, (pp. 89–98). Hershey (PA): Idea Group Reference. (ISBN 1-59140-982-9)