

Using Moodle and e-Assessment Methods During a Collaborative Inquiry Learning Scenario

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Overview...

- **Student Collaboration in IBSE (Inquiry Based Science Education)**
- **The emerging challenge and the Moodle educational platform**
- **Using Moodle resources to provide a theoretical base and to perform virtual experiments**
- **Using Moodle activities for student communication**
- **Using Moodle activities for student collaboration**
- **Using Moodle activities for providing feedback to students and teachers**
- **e-Assessment as the added value of this scenario**
- **Conclusions**



Inquiry Based Learning

«Tell me and I'll forget,
Show me and I'll remember,
Involve me and I'll understand...»

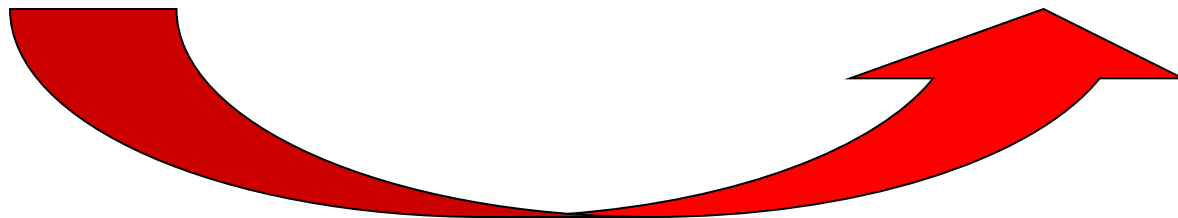


Computer Supported Collaborative Learning

Traditional learning



e-Learning environments



Computer Supported Collaborative Learning

Students communicate and cooperate using various types of collaborative activities and resources



Inquiry Based Learning in CSCL environments



The emerging challenge:

How can we combine *Inquiry Based Science Education* and *Collaboration* in modern *e-Learning environments*?

The added value:

How can we evaluate student *Involvement* and *Collaboration* as well as *Learning Outcomes*?

- Excellent
- Very good
- Good
- Average
- Poor



The Moodle Educational Platform



Let's use Moodle...

The word 'moodle' is written in a large, bold, orange-yellow font with a 3D effect. A red graduation cap is placed on top of the letter 'm'.

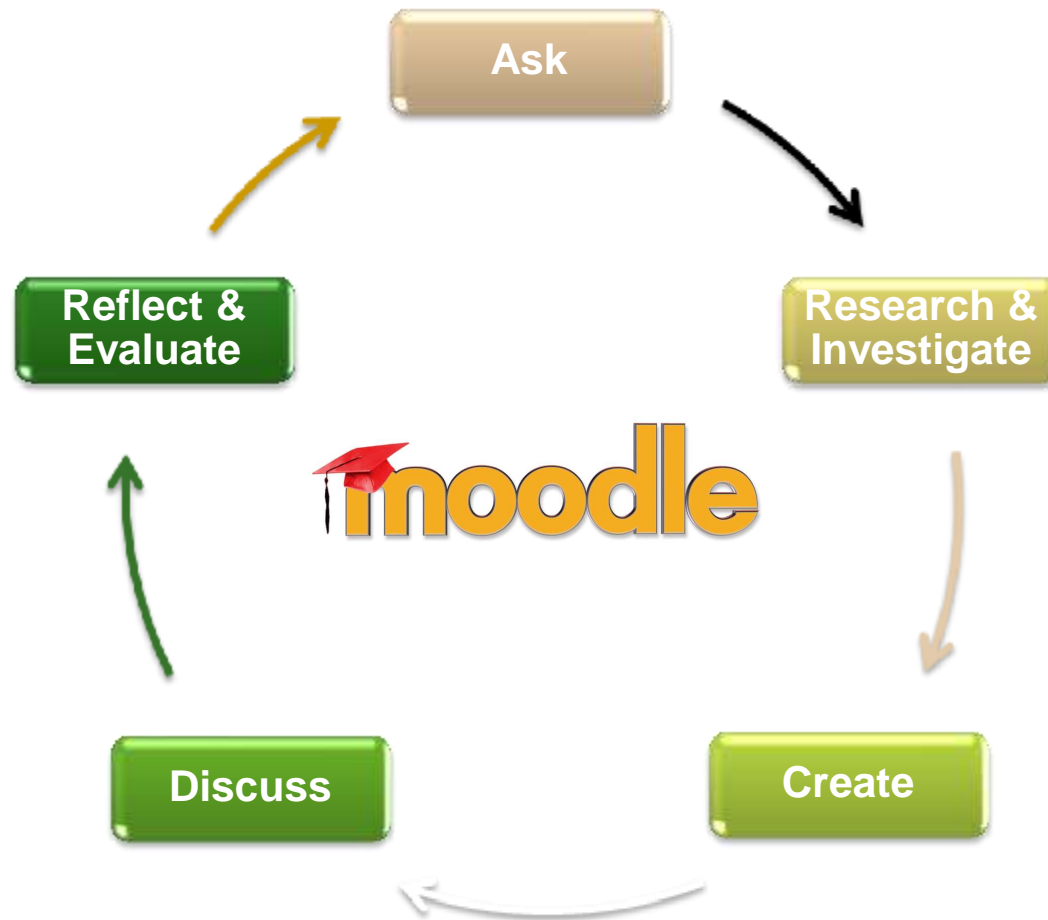
The Moodle Educational Platform



Why Moodle?

- ✓ It's a free and an open source educational platform
- ✓ It's used by millions of teachers and students worldwide
- ✓ It embeds common types of learning resources and various educational activities
- ✓ It can be upgraded by various modules and plugins
- ✓ It can be used to create well structured learning scenarios
- ✓ It contains many types of collaboration activities and communication modules
- ✓ It collects various logging data for all student interactions
- ✓ It contains advanced grading methods like rubrics and enriched rubrics

Using Moodle Activities and Resources in each step of an IBSE



Using Moodle resources for theory and experimentation



Moodle Resource Type

What does it do?



File

Upload various types of files online
(text, audio, video, flash)



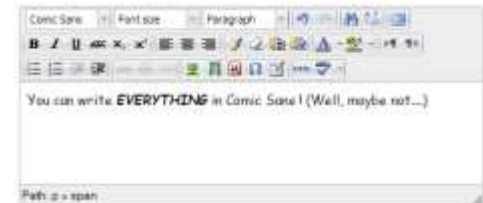
Folder

Organize files inside folders



Page

Create HTML pages using an online
rich text editor, embedding files and
objects



Book

Organize pages as chapters in a virtual book



URL

Use external links opened inside or outside the platform

Using Moodle resources for theory and experimentation



Moodle Resource Type

How can we use it?



File

- ✓ Deliver educational resources in various formats
- ✓ Use interactivity multimedia for virtual experiments
- ✓ File sharing



Folder

- ✓ Deliver structured course material for study



Page

- ✓ Create online learning material efficiently and effectively
- ✓ Deliver course resources according to site design
- ✓ Use custom HTML for special coding



Book

- ✓ Group resource pages in an orderly and tidy fashion



URL

- ✓ Use external resources embedded in course material



Using Moodle resources for theory and experimentation



Moodle Resource Type

Where can we use it?



File



Folder



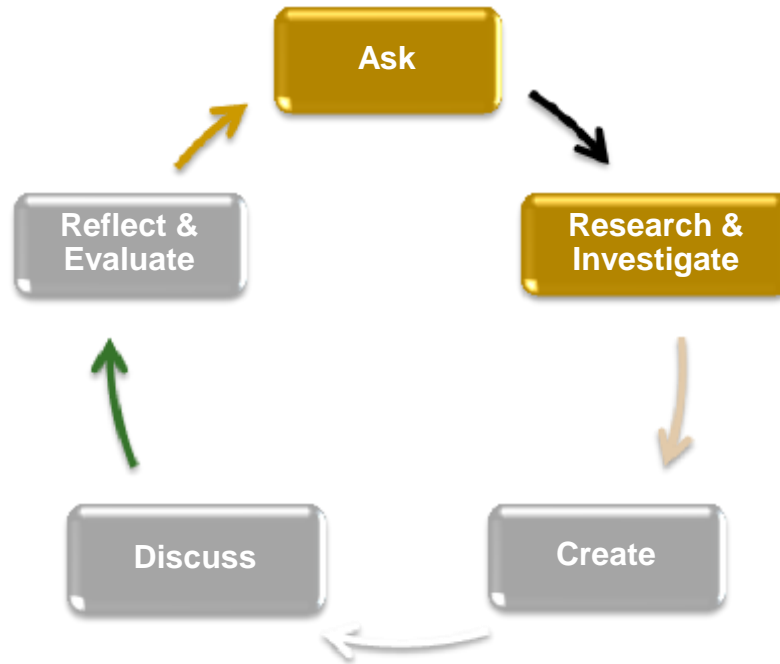
Page



Book



URL



Using Moodle activities for student communication



Moodle Activity Type

What does it do?



Chat

Facilitate a real-time synchronous discussion in a course



Forum



Create asynchronous discussions



Choice (polls)

Create online polls for questions with multiple choice answers





Moodle Activity Type

How can we use it?



Chat

- ✓ Strengthen student online communication
- ✓ Help students communicate in real time
- ✓ Prevent students from leaving the course's platform



Forum

- ✓ Promote online debates and discussions
- ✓ Promote knowledge sharing and mutual assistance
- ✓ Facilitate teacher – student communication
- ✓ Facilitate file sharing among students



Choice (polls)

- ✓ Present questions and confine possible responses
- ✓ Help students focus on particular aspects – solutions
- ✓ Share results and create public opinion on certain subjects

Using Moodle activities for student communication



Moodle Activity Type

Where can we use it?



Chat



Forum



Choice (polls)



Using Moodle activities for student collaboration



Moodle Activity Type

What does it do?



Database

Create a knowledge base of structured information for educational terms



Glossary

Create and maintain a list of definitions, like a dictionary



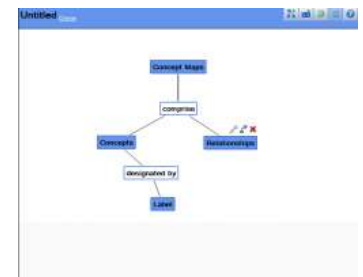
Wiki

Create a collection of collaboratively authored web pages that anyone can add to or edit



Concept Map

Create personal concept maps and collaborative mind maps



Using Moodle activities for student collaboration



Moodle Activity Type

How can we use it?



Database

- ✓ Create well structured and customizable information for special scientific terms and phenomena
- ✓ Use for collaborative reports for experiments
- ✓ Create scientific formulas, equations, etc.



Glossary

- ✓ Create a collaborative dictionary



Wiki

- ✓ Create a combination of all student deliverables in one set of web pages with various multimedia content
- ✓ Create and edit web pages easily
- ✓ Create grouped wikies



Concept Map

- ✓ Brainstorming
- ✓ Relate cause and effect
- ✓ Help students create correlative facts and procedures

Using Moodle activities for student collaboration



Moodle Activity Type

Where can we use it?



Database



Glossary



Wiki



Concept Map



Using Moodle activities for providing feedback



Moodle Activity Type

What does it do?

Quiz question types



Assignment

Grade and give comments for assignments created on and off line



Quiz

Design and set quiz tests, which may be automatically marked



Workshop

Facilitate self and peer assessment



Feedback

Create and conduct surveys

- ✓ Calculated
- ✓ Description
- ✓ Essay
- ✓ Matching
- ✓ Multiple Choice
- ✓ Short Answer
- ✓ Numerical
- ✓ True/False
- ✓ Drag & Drop
- ✓ Molecule Design
- ✓ Regular Expression

Using Moodle activities for providing feedback



Moodle Activity Type

How can we use it?



Assignment

- ✓ Perform qualitative evaluation upon student deliverables
- ✓ Use advanced grading methods (rubrics, marking guide)
- ✓ Inform students and give feedback



Quiz

- ✓ Create special types of answers for scientific questions like molecule design and regular expressions
- ✓ Give instant feedback to students



Workshop

- ✓ Use multiple criteria for assessing submissions
- ✓ Give submission examples for better understanding
- ✓ Form student working groups
- ✓ Share student deliverables



Feedback

- ✓ Create structured surveys with various types of answers
- ✓ Share results with students
- ✓ Students can evaluate the learning process

Using Moodle activities for providing feedback



Moodle Activity Type



Assignment



Quiz

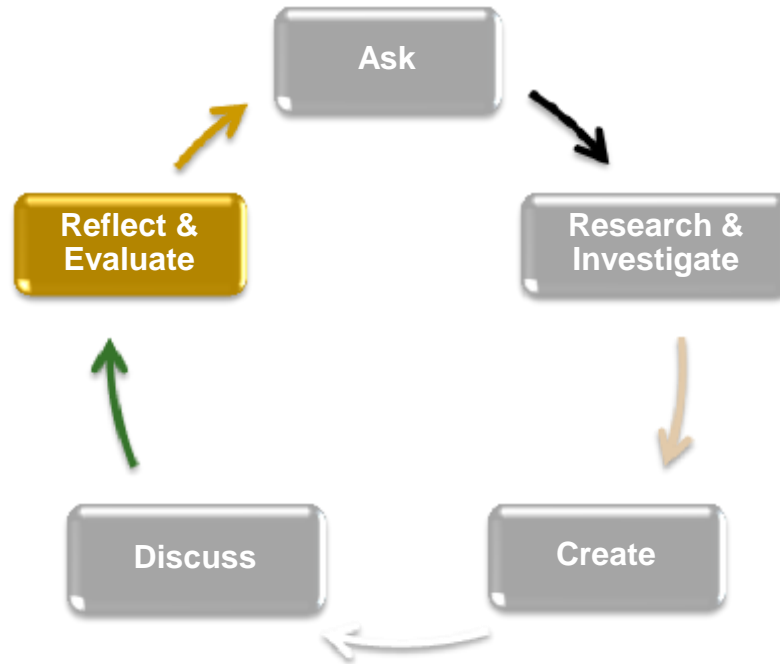


Workshop



Feedback

Where can we use it?



e-Assessment as the added value of this scenario



Advanced Grading Methods



Simple Rubric

Criteria based assessment with descriptive levels for each criterion



What does it do?

Item	Word count	Less than 100 words 0 points	100-150 words 1 point	151-200 words 2 points	200+ words 3 points	Score
Header	No header 0 points	Header is in a box 1 point	Header is correctly formatted - 1 item out of 3 2 points	Header is correctly formatted - 2 items out of 3 3 points	Header is correctly formatted - all items present 4 points	correct
Format	No header 0 points	Header is in a box 1 point	Header is correctly formatted - 1 item out of 3 2 points	Header is correctly formatted - 2 items out of 3 3 points	Header is correctly formatted - all items present 4 points	right - not good
Table of contents (TOC) by TOC	No TOC 0 points	TOC has been done by hand just using the software 1 point	TOC correctly formatted - all items present 2 points	TOC correctly formatted - all items present - all items are present 3 points	TOC correctly formatted - all items present - all items are present - TOC highlights and numbered 4 points	not even close that
Referencing	No referencing 0 points	Referencing by hand 1 point	Referencing 2 points	Referencing 3 points	Referencing 4 points	at least something good



Marking Guide

Diagrams Diagrams Evaluation Paper diagrams must be past along with calculations, conclusions, etc. No writing techniques allowed.	Your aim is to improve paper graphics in activities. Keep up the good work!	score: 2 /3
Spelling Spelling Evaluation Diagrams clear for reading areas. There are text elements too. Poor spelling generally demonstrates a poor work ethic.	Spelling elements are a draw a diagram. There are only text to read and understand their data displays a poor work ethic and undermine your credibility.	score: 0 /3
Content Content Shows Original Thought your understanding of the Subject Matter Please refer to past examples of outstanding essays that have been provided for you in your group/panel.	I wish you had provided some of your own original thoughts to put away rather than just copying facts that anyone could find by simply using the internet. The most important part of this essay was to relating with us what YOU think.	score: 1.5 /5

Criteria based assessment with maximum mark ups



Learning Analytics Enriched Rubric

Interaction analysis criteria based assessment with descriptive levels for each criterion

Students interacted	Minimal 0 points	Enough 1 points	More than enough 2 points
Check: collaboration			
Type: people interested			
to: General forum			
to: To know us better			
to: Instant sharing			
to: Show phase results more than (+)			
related to: student	0 people	1 people	2 people



e-Assessment as the added value of this scenario



Advanced Grading Methods

How can we use it?



Simple Rubric

- ✓ Distinguish learning and educational objectives
- ✓ Provide descriptive assessment and analytic feedback
- ✓ Use for almost every type of learning subjects
- ✓ Use for self & peer assessment



Marking Guide

- ✓ Less complicated criteria based assessment
- ✓ Use just a maximum mark for each criterion, no levels



Learning Analytics Enriched Rubric

- ✓ Embedded Interaction Analysis indicators
- ✓ Evaluate collaboration interactions, past grading and studying of course resources
- ✓ Automatic grading using Learning Analytics

e-Assessment as the added value of this scenario



Advanced Grading Methods



Simple Rubric



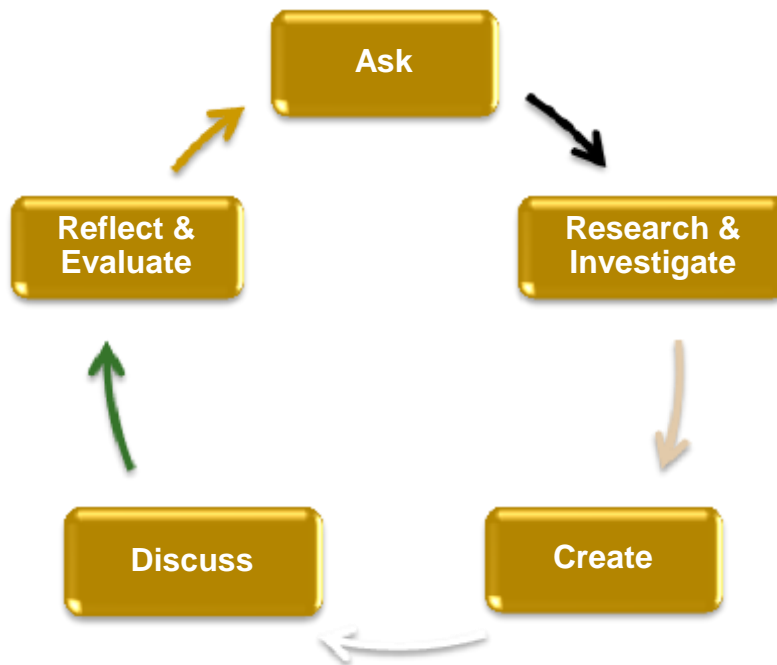
Marking Guide



Learning Analytics
Enriched Rubric



Where can we use it?



Why?

- ✓ Primary assessment
- ✓ Formative & Summative assessment
- ✓ Continuous & Final assessment
- ✓ Convergent & Divergent assessment
- ✓ Assess products & processes

e-Assessment as the added value of this scenario



The added value of the proposed e-Assessment tools and techniques can be summarized on the following...



- Assessment of *learning outcomes* and *acquired knowledge* via **Quizzes** and **Assignments**
- Clear specification of educational and instructional goals and objectives
 - ❖ *Criteria* based and *descriptive assessment* via **Rubrics**
 - ❖ Assessment of student interactions *evolvment, participation, cooperation* and *support to others* via **Enriched Rubrics** (LAe-R plugin) using Learning Analytics from Moodle log data
- *Peer* and *Self assessment* via **Workshops**
- *Holistic evaluation* for every step of an Inquired Based Learning scenario



Conclusions...

According to student and teacher feedback from field tests based on the proposed tools, derived the following...

- ✓ Moodle was greatly appreciated by teachers for providing various learning activities and resources
- ✓ The learning process became intriguing and more interesting to students
- ✓ Student engagement, participation and collaboration was increased as apposed to traditional learning
- ✓ Educational and instructional objectives where clear from the beginning of the course to students
- ✓ Student assessment was well structured and easier to perform by teachers
- ✓ Evaluation results where completely understood by students



More info...



CoSyLLab

(Computer Supported Learning Engineering Lab)

<http://cosy.ds.unipi.gr>

Moodle activities and resources

http://docs.moodle.org/24/en/Managing_a_Moodle_course

Moodle advanced grading methods

http://docs.moodle.org/24/en/Advanced_grading_methods

Acknowledgements...



**Strategies for Assessment of
Inquiry Learning in Science**

www.sails-project.eu

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European Research Area

