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*?

The Moodle Educational Platform

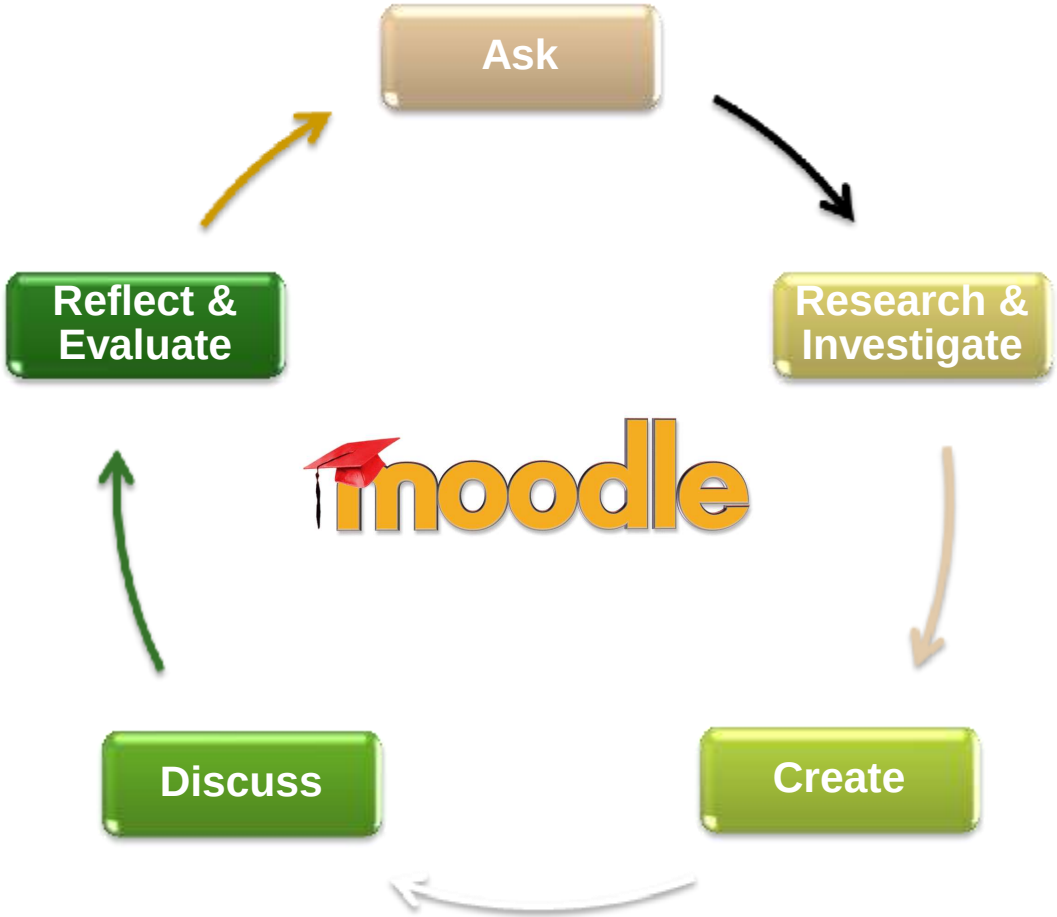
Let's use Moodle…

The Moodle Educational Platform

Why Moodle?

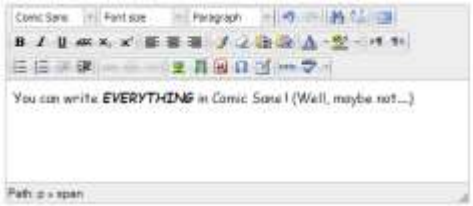
- ✓ It's a free and an open source educational platform
- ✓ It's used by millions of teachers and students worldwide
- ✓ It embeds common types of learning resources and various educational activities
- ✓ It can be upgraded by various modules and plugins
- ✓ It can be used to create well structured learning 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

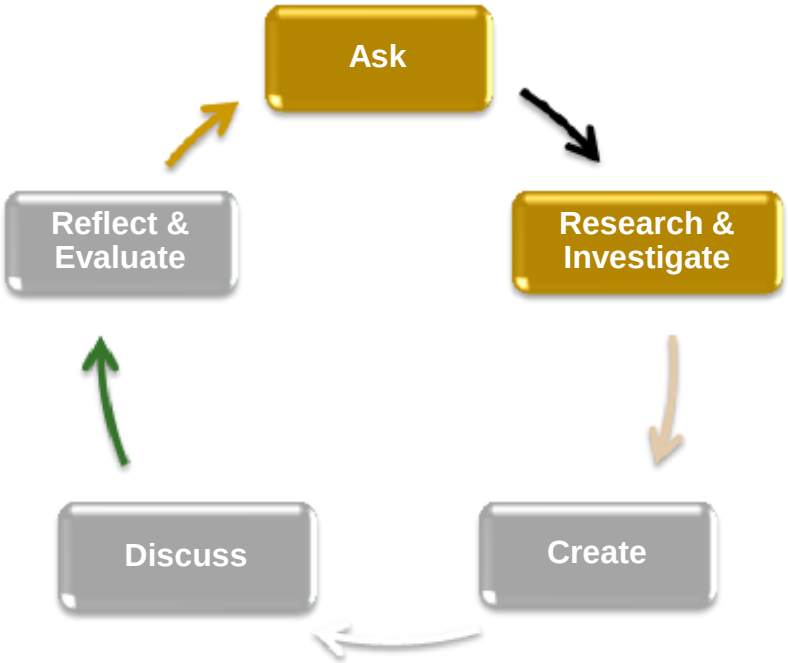
Moodle Resource Type	How can we use it?
File	✓ Deliver educational resources in various formats ✓ Use interactional multimedia for virtual experiments ✓ File sharing
Folder	✓ Deliver structured course material for study
Page	✓ Create online learning material efficiently and effectively ✓ Deliver course 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

- File
- Folder
- Page
- Book
- URL

Where can we use it?



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

Using Moodle activities for student communication

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

Chat

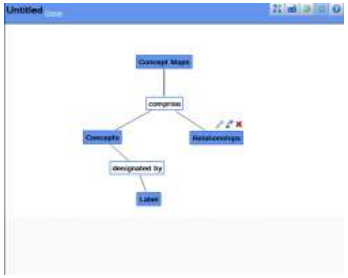
Forum

Choice (polls)

Where can we use it?

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

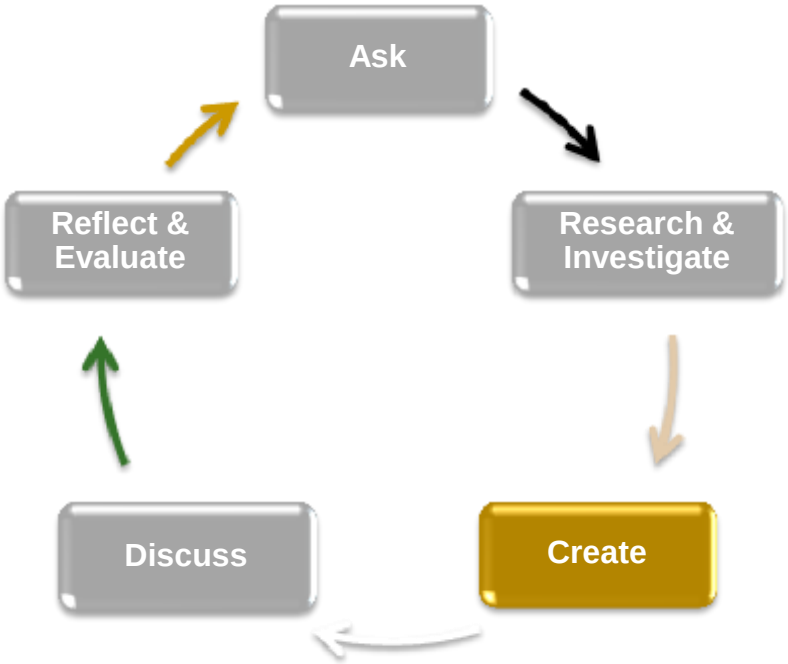
Moodle Activity Type	How can we use it?
Database	✓ Create well structured and customizable information for special scientific terms and phenomena ✓ Use for collaborative reports for experiments ✓ Create scientific formulas, equations, etc.
Glossary	✓ Create a collaborative dictionary
Wiki	✓ Create a 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

- Database
- Glossary
- Wiki
- Concept Map

Where can we use it?



Using Moodle activities for providing feedback

Moodle Activity Type	What does it do?
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

Quiz question types

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

Using Moodle activities for providing feedback

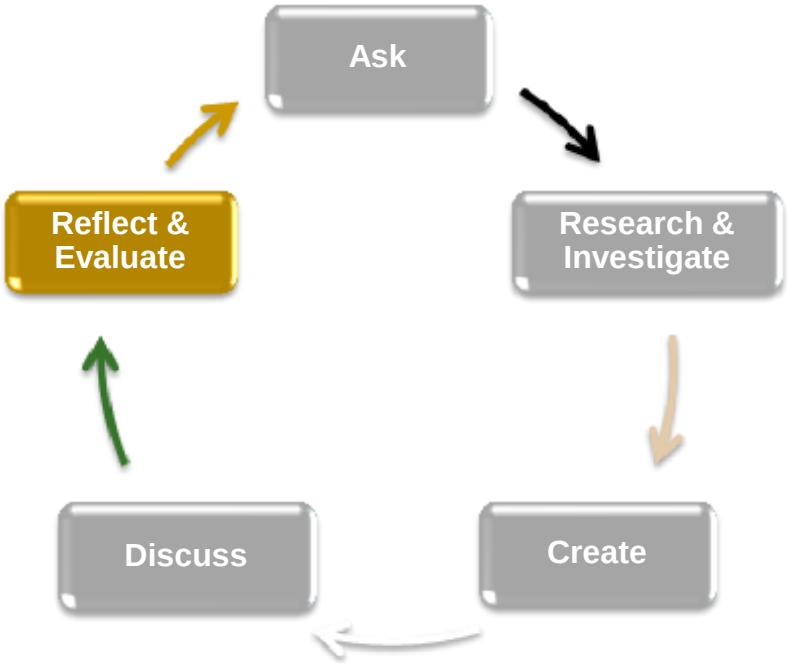
Moodle Activity Type	How can we use it?
Assignment	✓ Perform qualitative evaluation upon student deliverables ✓ Use advanced grading methods (rubrics, marking guide) ✓ Inform students and give feedback
Quiz	✓ Create special types of answers for scientific questions like molecule design and regular expressions ✓ 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

What does it do?

Simple Rubric

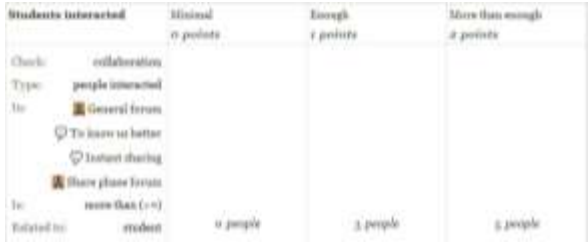
Criteria based assessment with descriptive levels for each criterion

Marking Guide

Criteria based assessment with maximum mark ups

Learning Analytics Enriched Rubric

Interaction analysis criteria based assessment with descriptive levels for each criterion



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 *evolvement*, *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…

SAILS
Strategies for Assessment of Inquiry Learning in Science

www.sails-project.eu

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CAPACITIES

European Research Area