Semantic Web Technologies for Supporting Peer Assessment

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Outline

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- Peer Assessment Scenario in IBL environments
- Challenges
- Semantic Models
- Peer Assessment Ontology
- Conclusion and Future work
General Context
Introduction

- Assessment is an important part of the learning process as it allows the learner to keep track of their progress in the knowledge acquisition process.

- **Peer assessment**
  - Involves the assessment of a piece of assessable work by one of the creator's peers.
  
  - A method in which students engage in reflective criticism of the products of other students and provide them with feedback using previously defined criteria.
Peer Assessment

Peer Assessment sub skills:

- (a) **defining assessment criteria**—thinking about what is required and referring to the product or process;
- (b) **judging the performance of a peer**—reflecting upon and identifying the strengths and weaknesses in a peer’s product and writing a report;
- (c) **providing feedback for future learning**—giving constructive feedback about the product of a peer.
Inquiry Based Learning

IBL engages students in:

- Authentic and problem-based learning
- A certain amount of experimental procedures, experiments and activities
- Self-regulated learning sequences
- Discursive argumentation and communication with peers.
Research Objectives

- Integrate peer assessment activities in an inquiry-based learning
- Guarantee selection, contextualization and rendering of unstructured content across tools as needed for peer assessment delivery
- Deliver assessment activities adapted to learner specific situation and context
Web 2.0 & Semantic Web

- **Web 2.0 tools**: Social bookmarking, Social networks, Microblogging, Blogs, Wikis, …
  - Collect and diffusion of pedagogical resources and to facilitate the creation and sharing of information
  - Collaborative work, Group discussions, ….

- **Semantic Web facilitates the sharing of meaning and semantics**

  ➔ Demonstrate how semantic web technologies combined with web 2.0 tools can be used for peer assessment process in IBL environments.
Peer Assessment Scenario in IBL environments
Typical Peer Assessment Scenario

- **Step 1**: Initialization.
- **Step 2**: Learning activity which will be later assessed.
- **Step 3**: Performing Peer assessment.
  - *Stage 1*: defining assessment grid.
  - *Stage 2*: producing peer assessment.
- **Step 4**: Analyzing results of assessment.
- **Step 5**: Re-assessment.
- **Step 6**: Calculating the final grade.
Typical IBL scenario

IBL Activity 1.
Problem analysis in small groups

IBL Activity 2.
Activation of prior knowledge

IBL Activity 3.
Elaboration of a common strategy

IBL Activity 4.
Collaborative work and exploitation

IBL Activity 5.
Collaborative report writing

IBL Activity 6.
Institutionalization

Peer Assessment Sub activities
Peer sub activity in IBL activity 4

■ Step 2: Learning activity which to be assessed: Each group is asked to evaluate internally the data collected by its members.

■ Step 3: Performing Peer assessment
  
  • Stage 1: defining assessment grid.
    - intra peer assessment criteria is established
    - Grid is discussed using the group’s blog.
  
  • Stage 2: producing peer assessment.
    - feedback from the learners on the deposited resources, by sharing them on the social media applications of each learner,
    - learner rotates around the resources, leaves comments, suggests and critiques on i.e. a forum available on the group coordinator social media applications.
Peer sub activity in IBL activity 4

**Step 4: Analyzing results of assessment**

- Group members analyze the quality of assessments conducted by the peers from their group.
- They read the comments posted by their peers on the shared data.
Peer sub-activity in IBL activity 5

- **Step 2**: Learning activity which to be assessed: each group is asked to evaluate all reports produced by other groups.

- **Step 3**: Performing Peer assessment.
  - *Stage 1: defining assessment grid.:
    - inter peer assessment criteria
    - negotiate the scoring scales using communication tools and shared forums
  - *Stage 2: producing peer assessment.*
    - provide constructive feedback about the reports done by other groups.
    - Every Learner deliver an assessment scheme that includes his/her appreciation and share it with his/her group members on document sharing tools.

- **Step 4**: Analyzing results of assessment. Assessment reports available for all learners and discussed with the tutor via i.e forums.
Semantic Models
Scenario Challenges

Requirements

- Different categories of relevant entities: learners, tutors (trainers), learners’ group or subgroup,
- Different locations, Activities for among learners
- Information is distributed across web 2.0 tools. (data silo)
- Concepts of the domain to be considered
- Communication tools and more generally social media applications, devices.
Scenario Challenges

**Needs**

- Information seeking: information retrieved and/or produced by learners, learner groups according to a specific activity and/or location and more generally to a specific situation.
- Reuse and exchange of data among social tools by means of API.

**Ontologies**

- Provide a precise semantic for the learning domain, the learning activities, the different categories of stakeholders, the collected and produced content, the learning context and all peer assessment activities and components (criteria, grid, …).
Semantic Models

- User Model
- Activity Model
- Peer Assessment Model
- Domain Model
- Resource Model
Semantic Models

- **User Model**
  - Timely information on users and contexts of learning to be able to personalize the assessment according to learners’ preferences and characteristics.

- **Activity Model**
  - Organization of the learning and assessment activities in order to provide learning sequence according to IBL scenario.
  - A specialization of the “Activity” concept in the OPO ontology (Online Presence Ontology).
Semantic Models

- **Peer Assessment Model**
  - *Included in the Activity model* to provide assessment. We need to be able to select the appropriate assessment activities according to the assessment scenario and its context of deployment (Time, place, used devices, used communications and collaborations tools).

- **Domain Model**
  - Have an efficient manner to retrieve key resources.
  - Metadata annotation of assessment resources.
  - Reference to domain ontology.
Semantic Models

Resource model (metadata model)

- Domain and resource models are used to index resources.
- Some metadata can be generated automatically (sometimes on the fly) according to common vocabularies like Dublin Core, SKOS, SIOC, FOAF, etc. (lightweight ontologies)
- On the contrary, learners and/or teachers need to define the relevant domain concepts describing a post
Peer Assessment
Ontology
Peer Assessment Ontology

Class hierarchy: scenario:Content

- Thing
  - <http://www.w3.org/2004/02/skos/core#Concept>
  - foaf:Group
  - olo:Activity
  - scenario:entities
    - scenario:Content
      - scenario:Course
      - scenario:Domain
      - scenario:Evaluation
      - scenario:LearningActivity
      - scenario:Assessment
        - Peer:Peer_Assessment_Activity
      - scenario:Communication
      - scenario:Content_Production
      - scenario:Data_Collection
      - scenario:Experiment
      - scenario:Individual_Search
      - scenario:Planning
      - scenario:Prior_Knowledge_Activation
      - scenario:Problem_Analysis
      - scenario:Report_Writing
      - scenario:Search
      - scenario:Site_Visit
      - scenario:Strategy_Elaboration
      - scenario:Work_Exploitation
      - scenario:Problem
      - scenario:Status
      - scenario:Tool
      - sioc:UserAccount
Peer Assessment Ontology
Peer Assessment Ontology

- **Assessment Content and corresponding semantic metadata**
  - can be extracted on the fly from social media applications and by specific modified plugins (sioc_export) and stored in an RDF repository.

- **Use of several light ontologies** SIOC, FOAF, DC, RDF, RDFS, OPO
  - The OPO ontology enables us to describe user “activities” by means of the concept “action”

- **An activity has different status:**
  - Inactive, Ongoing, Suspended and Terminated.
  - It can be realized by a learner or a learner group and may provide outcomes linked to it in particular tools.
Peer assessment ontology (Cont.)

Description: scenario:LearningActivity

Equivalent To

SubClass Of

- obo:Activity
- scenario:assignToGroup only foaf:Group
- scenario:assignToUser only sioc:UserAccount
- scenario:createdByGroup only foaf:Group
- scenario:createdByUser only sioc:UserAccount
- scenario:entities
- scenario:hasEvaluation only scenario:Evaluation
- scenario:hasRelatedContent only scenario:Content
- scenario:hasStatus only scenario:Status
- scenario:hasSupportTool only scenario:Tool

SubClass Of (Anonymous Ancestor)

- <http://purl.org/dc/terms/description> only xsd:string
- <http://purl.org/dc/terms/title> only xsd:string
- sioc:link only xsd:anyURI

Members

Target for Key

Disjoint With

Disjoint Union Of
Conclusion and Future Work

- Design of peer assessment ontology dedicated to a generic IBL activity model defined as a specialization of the Online Presence Ontology;

- Use of Several ontologies and semantic web technologies to implement the peer assessment activities as part of the learning process;

- Next step: Peer Assessment in MOOCs