Towards Folksonomy as an Instrument for Integrating Cultures

Bert Bredeweg
University of Amsterdam
The Netherlands
B.Bredeweg@uva.nl

This work is co-funded by the EC within FP7, Project no. 231526, http://www.DynaLearn.eu
Overview

• Present the DynaLearn project
  – Context
  – Examples
  – Conceptual modelling workbench
  – Semantic technology
  – Virtual characters
  – Architecture details (example)
  – Results and status

• Introduce folksonomy

• Identify future challenges
Context and Relevance

• Having learners acquiring *conceptual knowledge* of system’s behaviour.
  – **Important** for society to successfully interact with its environment.
  – Being able to adequately explain and predict the behaviour of systems to utilise their functioning for human benefit.
  – A prerequisite for working with numerical models and equations.

• Hence, policymakers and other stakeholders strive to accomplish *effective science education*. 
Problem statement

• Worrying decline in science curricula
  – Less students sign up
  – More students drop out

• Main reasons
  – Lack of engagement and motivation in science teaching
  – Lack of tools to interactively construct conceptual knowledge

e.g. Osborne et al. 2003
DynaLearn - Main objective

• To develop an interactive learning environment that allows learners to construct their conceptual system knowledge, either individually or in a collaborative setting.

• The workbench will have three strategic characteristics:
  – Accommodate the true nature of conceptual knowledge
  – Be engaging by using personified agent technology
  – React to the individual knowledge needs of learners

Integrate proven technology
Overview

• Present the DynaLearn project
  – Context
  – Examples
  – Conceptual modelling workbench
  – Semantic technology
  – Virtual characters
  – Architecture details (example)
  – Results and status

• Introduce folksonomy

• Identify future challenges
38. Later fall frosts and the northward migration of some tree and plant species may indicate which of the following global changes?

(A) Increased global temperatures
(B) The effects of more ultraviolet light from the sun
(C) A reduction in the volume of ice at the North and South Poles
(D) Changes in global precipitation patterns
(E) Flooding of areas near the ocean
Causality → Directedness

- We say that:
  - An increase (or decrease) in Force causes an increase (or decrease) in Acceleration
  - An increase (or decrease) in Mass causes an decrease (or increase) in Acceleration

- But we do not say:
  - An increase in Acceleration causes …
Overview

• Present the DynaLearn project
  – Context
  – Examples
    – Conceptual modelling workbench
    – Semantic technology
    – Virtual characters
    – Architecture details (example)
    – Results and status

• Introduce folksonomy

• Identify future challenges
- Challenge and innovation
  - Easy to use *multi use-level* workbench
  - Automated model feedback
    - explaining discrepancies with expectations
Expressing conceptual knowledge (Use level 2)

Model details inspired by Dehghani et al., 2007 (Int. workshop on QR)

There are 6 use levels

Integrating Cultures
April 6-9, 2010
Simulating conceptual knowledge \textit{(Use level 2)}

There are 6 use levels

Model details inspired by Dehghani et.al., 2007 (Int. workshop on QR)
Representation & Icons

• Entity
• Attribute
• Configuration
• Quantity
• Quantity space
• Scenario
• Model fragment
• Agent
• Assumption

• Causality
• In/equality
• Correspondence
  – Option: directional
• Calculus

Colour coding
• Red: Condition; Blue: Consequences; etc
Overview

• Present the DynaLearn project
  – Context
  – Examples
  – Conceptual modelling workbench
  – Semantic technology
  – Virtual characters
  – Architecture details (example)
  – Results and status

• Introduce folksonomy

• Identify future challenges
Generating feedback (1)

Expert/teacher

Student

http://dbpedia.org/resource/Size

http://dbpedia.org/resource/Population

http://dbpedia.org/resource/Mortality_rate

Semantic repository

M103b population has number of individuals

Number of

Death rate

Population

DynaLearn

Zsmbmax

Max

Big

Medium

Small

Zero

Positive

δ

δ

δ

δ
Generating feedback (2)

e.g., “You can complete your model with a P+ proportionality”

Student

e.g., “Users who modelled death also modelled birth”

feedback

Community of users

recommendations
Overview

• Present the DynaLearn project
  – Context
  – Examples
  – Conceptual modelling workbench
  – Semantic technology
  – Virtual characters
  – Architecture details (example)
  – Results and status

• Introduce folksonomy

• Identify future challenges
Character roles

- Basic help (what is, how to, ..)
- Advanced help (model diagnosis)
- Teachable agent
- Model comparison
- Critic
- Quiz
Use case: Teachable agent

Biswa, et.al (Betty's Brain)
Overview

• Present the DynaLearn project
  – Context
  – Examples
  – Conceptual modelling workbench
  – Semantic technology
  – Virtual characters
  – Architecture details (example)
  – Results and status
• Introduce folksonomy
• Identify future challenges
Question generation and answering – Architecture

Build
Simulate

QR model & Simulation

Question templates
Criteria: Selection & ordering

Generate questions

Question request

Determine focus

Bayesian Network

Process answer
Dialogue history

Express question

Question

Question list
Select question
Overview

• Present the DynaLearn project
  – Context
  – Examples
  – Conceptual modelling workbench
  – Semantic technology
  – Virtual characters
  – Architecture details (example)
  – Results and status

• Introduce folksonomy

• Identify future challenges
Mediated communication

Supporting domain experts with theory development

Automated conceptual reasoner

Tutoring & training

Groups and cultures

Integrating Cultures
April 6-9, 2010
Overview

• Present the DynaLearn project
  – Context
  – Examples
  – Conceptual modelling workbench
  – Semantic technology
  – Virtual characters
  – Architecture details (example)
  – Results and status

• Introduce folksonomy

• Identify future challenges
Folksonomy (Wikipedia)

- A folksonomy is a system of classification derived from the practice and method of collaboratively creating and managing tags to annotate and categorize content.

- Folksonomy = folk + taxonomy

- Creating a folksonomy is a dynamic process, in which knowledge and understanding is actively constructed.

E.g., M. Dehghani (PhD thesis, 2009)
Overview

• Present the DynaLearn project
  – Context
  – Examples
  – Conceptual modelling workbench
  – Semantic technology
  – Virtual characters
  – Architecture details (example)
  – Results and status

• Introduce folksonomy

• Identify future challenges
Integrating cultures:

an Application

• Interleave in the communicative interaction:
  – Conceptual knowledge
  – Cultural values

• Practical goal:
  – Capture knowledge and values
    ▪ Formalise
    ▪ Infer consequences (by running simulations)
  – Building capacity
    ▪ Dissemination and (Cultural) Awareness
    ▪ Education

Conflict identification and resolution
Concluding remarks

• General
  – Conceptual models are important means for humans to reasoning about their environment.

• Previous and ongoing work
  – Workbench for constructing conceptual knowledge
    ▪ Capturing theories hold by Experts
    ▪ A tool for learning (DynaLearn project)

• Possible future work
  – Addressing groups and cultures
    ▪ Collaboration
    ▪ Cultural values