A proposal to support collaborative learning using a structure to share context

ICTE, International Conference on ICT in Education,
Badajoz, Spain, 13-16 November

Luís Borges Gouveia
lmbg@ufp.pt
CEREM, University Fernando Pessoa

introduction: the work context (I)

- **problem**:
  - how to share knowledge between a group of people engaged in learning activities
- **difficulties** supporting collaborative learning
  - (1) support the sharing of knowledge between users;
  - (2) support the learning process across distributed groups within a given educational setting;
  - (3) provide distributed access to knowledge from different types of machines

introduction: the work context (II)

- how a common structure for knowledge sharing can be used in distributed environments for collaborative learning in a higher education context (by providing a 3D interactive visualisation)
- **proposal**
  - the development of a visualisation design to convey information of a common structure for knowledge sharing to be created and enhanced in an educational context
- **assertion**
  - the use of both the visualisation design and the structure for knowledge sharing can support collaborative learning

introduction : the work context (III)

- pressure to improve learning environments and use Information and Communication Technologies (ICT) in innovative educational contexts [Goodyear, 1999]
  - growing number of computer-networked systems to support learning
- current systems for collaborative learning do not support the same knowledge sharing environment that face-to-face situations enjoy
  - difficulties to representing context and knowledge
  - knowledge sharing is a problem in presential teaching and grows when with distance education settings

from content to context

- efforts to improve learning and education must emphasise not only content but also context
  - learners play an active role in discovering knowledge for themselves and their social environment has a strong influence in promoting changes [Lewin and Grabbe, 1945]
  - knowledge results, not from a transmission process, but from the internalisation of social interactions [Vygotsky, 1978]
- use a 3D visualisation and interactivity within virtual worlds
  - in the form of structured knowledge for representing context, to be visually mapped and explored using direct manipulation
  - a representation can complement existing tools to allow context sharing of a given knowledge theme

collaborative learning

- defined as groups working together for a common learning propose [Resta, 1995]
- to collaborate effectively in work group, each individual
  - must share a common grounding of concepts
  - must possess a common mental map representation for reference, to understand the meanings and relations underlying knowledge
- the use of a common mental map visual representation allows for collaborative construction and enhancement
  - provides the opportunity to augment both individual and collaborative learning

support collaborative learning

- the following ideas are proposed:
  - ? a structure for representing the knowledge being shared;
  - ? a visualisation design to convey information about the structure;
  - ? an environment to allow to discuss and collaboratively enhance the knowledge being shared

support collaborative learning: how?

? the work attempts to propose a visualisation design addressing the problems of:

- ? **cognitive overhead**: by allowing a abstract high level for information representation [Norman, 1991] and thus providing the means to integrate data using Information Visualisation techniques [Card et al. 1999];
- ? **information overload**: by allowing each individual user to take advantage of a structure for knowledge sharing and thus providing a context for reasoning about a particular knowledge theme [Huhns and Singh, 1997].

work approach

- the study of face-to-face collaborative learning situations and knowledge construction provide important insights to develop a virtual world, to support similar functionality
  - propose that users can contribute to enhance an existent domain knowledge model [Huhns and Singh, 1997]
  - using a set of symbols to represent a knowledge domain to be used by each individual [Huhns and Stephens, 1999]
  - use a set of symbols in the visualisation design to provide a visual mental map representation helping to keep cognitive overhead and information overload problems minimised [Tufte, 1990]

final remarks

- the general outcomes of this research are:
  - ? use of a structure to represent knowledge, conveying information to be enhanced by collaboration. The structure allows the knowledge specification, knowledge sharing and generate the visualisation
  - ? a 3D interactive visualisation to convey structure information: allowing the visual image and individual exploration of the structure for knowledge sharing
  - ? proposing a generic knowledge support to use for collaborative learning: resulting in the joint use of the structure for knowledge sharing and a 3D interactive visualisation
  - ? provide the means for integration knowledge and a data source in the same interface: by giving a visual representation for the knowledge using Information Visualisation techniques