

TRAINING IN PROFILING, NEGOTIATION AND CRISIS MANAGEMENT

Using an Immersive and Adaptive Environment

Leonidas Anthopoulos, Vasilis Gerogiannis, Panos Fitsilis

Project Management Department, Technological Educational Institute (TEI) of Larissa, TEI of Larissa, Larissa, Greece

Achilleas Kameas

Hellenic Open University (HOU), Patras, Greece

DAISy group, Research Academic Computer Technology Institute (CTI), Patras, Greece

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Abstract: The aim of the proposed position paper is to identify an information system that can support the lifelong training of various types of demanding learners who have to transact and to do business with “unknown” people, in unfamiliar environments. Three types of learners are chosen as potential groups that comply with these characteristics: a) diplomatic staff, b) security staff and c) business experts (who work for multilateral companies). An environment that will provide engaging and motivating educational experiences to these learner targets is useful for these target groups, since it (a) utilizes a rich knowledge base of appropriately coded experience in negotiation methods, crisis management, decision making and legal affairs, (b) employs immersive interfaces to provide trainees with a first person learning experience, (c) takes into account the personal profile and background of each trainee in order to achieve deep learning, (d) is based on the pedagogical principles of socio-constructivist theories to achieve long-time knowledge retention, (e) incorporates methods of information retrieval for automatic profile extraction and (g) utilizes social networking analysis for automatic team creation. The presented system can be built by exploiting recent relevant research on knowledge representation, learner modelling, adaptive hypermedia systems, immersive applications, text mining and automatic profile extraction, and social networking technology.-

1 INTRODUCTION

The purpose of this position paper is to deal with the following problem: “Professionals especially from Foreign Ministries (but also from Security Agencies and from international organizations) have to undertake significant procedures concerning negotiation and crisis management in unfamiliar environments with unfamiliar people”.

In order to prepare these professionals properly, we consider that information and communications technology (ICT) immersive environments can train them accurately and familiarize them with the conditions that they will probably face in their professional missions. Additionally, immersive applications can strengthen their skills concerning negotiation in virtual environments and profile

construction of unfamiliar participants.

A training (e-learning) immersive environment can contribute to fulfil the following major objectives:

- Strengthen significant target groups of professionals about their future groups difficult missions. Their missions concern crisis management, negotiation with people they do not know and they have to approach, and work on services and skills that they do not hold. These missions are, in particular, very critical for the staff of Ministries of Foreign Affairs, who have to respond appropriately in various situations, ranging from the management of political crisis to the service of people requiring dispatching in different countries.

- Similar challenges face also other professionals, such as security officers (e.g. policemen who have to negotiate with foreign security authorities in third countries or to talk with and secure evidence about suspects for terrorism) and executives of international companies who have to negotiate about selling products in foreign countries.
- Serve contemporary challenges concerning i) foreign affairs by improving skills of diplomatic staff in doing negotiations abroad), ii) virtual diplomacy by improving diplomatic efficiency in operating in virtual worlds (these worlds already exist in social networks such as the Second Life, the FaceBook and the mySpace environment), iii) security by improving security staff in terrorism prediction and avoidance and iv) external trade by offering tools that support European companies in international trade.

All of the above target groups are examples of professionals which have to strengthen their skills in negotiation and crisis management in unfamiliar environments. Such skills can hardly be learnt through the practices of a traditional formal education system, which, by its nature, can only involve trainees in third person experiences of short duration. For example, diplomats study and analyze episodes of international diplomacy and use them as reference cases upon which they accumulate their experience. Security officers usually watch their colleagues apply in practice the principles of psychology and effective communication they have learnt during their training and learn by evaluating these outcomes. Commercial representatives analyze data about their clients or competitors and usually learn negotiation skills “the hard way”. In all these cases, the cost to be paid for any kind of failure (i.e. breach of protocol, ignorance of culture, cultural clash, inability to negotiate effectively with criminals, inadequate profiling of competitors, etc) is high and more than often it cannot be tolerated.

The first section presents the principles of the potential information system. The next section combines various technologies required for the development of this system. The final section summarizes on the contribution and the outcomes of this system.

2 INFORMATION SYSTEM'S PRINCIPLES

We propose an adaptive and immersive information

system to deal with the improvement of professional skills on negotiation and crisis management, which for the purposes of this paper is called the NEGOTIATOR. Its principles can be summarized to the following: (a) Authentic experiences' provision. Such experiences allow learners to transfer knowledge from formal education to practice, and so provide opportunities for meaningful learning (Grabinger, 1994). Authentic learning activities are based on the hypothesis that learning outcomes will be enhanced if the activities students engage in more directly reflect contexts of their actual practice (Dewey, 1966).

(b) Socio-constructive: Jonassen (1999) argues that the inclusion of cases in a socio-constructivist learning environment provides learners with access to experiences that they have not previously encountered. Furthermore a case-based approach which combines engagement with meaningful real-world tasks and expert coaching can provide deeper insights into processes and practices (Jonassen et al., 1993). Experts differ from novices in that they have a richer base of knowledge, are able to recognize and analyze patterns, and are fluent in applying knowledge and solving problems in practical situations (Rubin and Alvermann, 1990).

(c) Case-based learning: Case-studies are descriptions of a pragmatic activity, event, or problem, drawn from the real world of professional practice. They provide models of practice to learners and novice practitioners. They seek to engage the learner in the context of a real situation. Case-studies can support authentic learning experiences by presenting episodes of real professional practice. Research has provided evidence that case-based learning promotes key meta-cognitive skills, including cognitive elaboration, error management, reflection, self-regulation, and transfer of knowledge (Carroll & Rosson 2005).

(d) Multimedia training: Multimedia training case-studies intrinsically possess a great potential for higher professional training because they can be used to situate the content by highlighting situations from authentic professional settings, promote cognitive flexibility by exposing novices to the ill-structured nature of the case, and finally, they encourage reflection.

(e) Collaborative learning: the NEGOTIATOR can be an e-learning environment deeply grounded in the socio-constructive pedagogical stream (Sancho, Fuentes-Fernández and Fernández-Manjón, 2007), (Vygotsky, 1978). In NEGOTIATOR, active and collaborative learning procedures can take place in the scenario (case study) of a virtual world

presented in the format of a 3D videogame. NEGOTIATOR will take the learners (represented by avatars) into a futurist case-study where they will have to solve a mission, working in collaboration with other learners inside a team. In this context, learners gain knowledge during *Problem Solving Procedures* and *Collaboration procedures*.

Therefore, NEGOTIATOR can combine the Problem Based Learning (PBL) (Savery and Duffy, 1996) and the Computer Supported Collaborative Learning (CSCL) (Koschman, 1994) approaches in a framework that uses a multiplayer role videogame as the delivery format.

An implicit assumption in collaborative learning is that learners learn one from another. Therefore, the way in which learners are grouped has a strong impact on the results of the learning process. A positive learning experience might turn into a negative one depending on the group composition.

Even so, for CSCL and PBL to be effective, the learners need some guidance through the different stages. In lack of adequate guidance and help, students may easily lose focus and get frustrated (He, Kinshuk, and Patel, 2002). This means a considerable increase of the workload for teachers. They not only have to change their role from knowledge transmitters to some sort of expert co-learners who give hints and guidance but, moreover, they also have to track the progress of a number of small learners' groups.

The NEGOTIATOR system can address these pedagogical concepts by means of an adaptation model that will rely on Vermunt's conception and classification of learning styles (Vermunt, 1992). The Vermunt's "Inventory of Learning Styles" will be implemented to distinguish the learners that need a more intensive guidance through the learning process, from those who are more capable of driving alone their own learning experience. By grouping learners, we presume that the most autonomous and capable learners will assume part of the tutor's job in leading and guiding the group. At the same time, the effectiveness of the collaboration process within a team will improve by joining tutors with complementary learning strategies. For this purpose, the learning strategies in NEGOTIATOR can be implemented by using de-facto standards for educational modelling (such as the IMS-LD specification (IMS Global Consortium, 2005)). The main objective will be to support a high-level of adaptation of the instructional strategies to the learning styles as well as to support collaborative approaches to learning.

3 TECHNOLOGIES COMBINED

This section presents the state-of-the-art (SOTA) technologies relevant to technology enhanced learning area that are combined in the NEGOTIATOR: a) Ontologies and semantic integration; b) Technology-enhanced learning; c) Virtual Learning and Collaborative Environments; d) E-learning system architectures; e) Discovering Similarity in Social Networks using Graph Mining; and f) Text Mining

3.1 Ontologies and Semantic Integration

Currently, there are two major standardization efforts in the ontology domain, carried out by IEEE and the World Wide Web Consortium (W3C). The former is concerned with a standard for upper ontology, and due to its general approach is likely to have only a limited impact. The proposal of W3C and its ontology task group concerns the ontology language OWL (Web Ontology Language), which is the evolution of DAML+OIL. Both the OWL and the DAML+OIL are based on a branch of logics called Description Logics (DL). These logics are a subset of First Order Logic (FOL) that are well suited to expressing terminology and instance information, with efficient and decidable inference characteristics. The OWL language provides support for merging of ontologies, through the use of language features which enable importing other ontologies and enable expression of conceptual equivalence and disjunction. This establishes distinct ontology development, refinement and re-use.

3.2 Technology Enhanced Learning

The NEGOTIATOR can incorporate the experiences and the outcomes of various research projects such as the KALEIDOSCOPE (<http://www.noekaleidoscope.org>) results on using ICT to support learning processes; the ProLearn (<http://www.prolearn-project.org>) integrates the key areas of research most relevant to professional learning; the iClass (<http://www.iclass.info>) that developed the Self-Regulated Personalised Learning Model; and the Integrated Project ELeGI (<http://www.elegi.org>) promotes learning as a knowledge construction process that combines experiential, contextualized and collaborative approaches in a personalized and adaptive way.

3.3 Virtual Learning and Collaborative Environments

People used to have virtual experiences without the involvement of technology: watching a film, reading a book, listening to music, or being caught up in a reverie or a conversation. What gives such virtual experiences this quality of immersion? Four interrelated factors have been defined to measure virtual experience (Heim, 1993): interest, involvement, imagination, and interaction. However, Virtual Reality (VR) is strongly interrelated with computers and today it has many applications: a) engineering and urban design, b) training (e.g. flight simulators), c) health, d) education (Virtual Learning Environments (VLE) and Virtual Learning and Collaborating Environments (VLEC)), f) environmental simulation, g) computer science, h) robotics, i) gaming etc.

When people transact with virtual environments and worlds, change occur in how they inhabit the virtual space (Turkle, 1995); often by constructing online identities ('avatars') that are different – sometimes dramatically different;

The notion of a learning activity in VLEs refers to something richer than in individual courseware, closer to the notion of NEGOTIATOR. The difference between other constructivist environments and what virtual environments potentially offer can be described as making students not only active, but also actors, i.e. members and contributors of the social and information space.

3.4 e-Learning System Architectures

The architecture of the information system that can host the NEGOTIATOR (presented in Fig. 1) will follow a complete web services structure, with full abstraction of the end user interfaces from the resources it uses. The whole architecture will have a storage unit for all content items, with a heavily extensible metadata suitable for education, IEEE LOM (Learning Objects Metadata) variation.

The system can contain a Fedora Commons layer for storage of the learning objects, small and large in order to secure: a) the complete independence of the data objects, not being restricted as to type, size or scope, b) the preservation and version control available, c) the collection nature of the data, and connectiveness of the fox_xml, d) the abstraction of this content from any of the services, scenarios that front end / end users applications may involve, e) the learning scenarios are objects in this system, just the same as individual learning resources are.

One of the key aspects of the abstraction would be the web service interfaces to the content and metadata. Context based search and semantic and traditional relevance search can be layered onto this, to provide front end applications with restful interfaces and other APIs to deliver the content outwards. These also facilitate faceted browsing of the content which will aid in the inclusion of content objects into scenarios.

Overall, the front end can be a range of applications, but should be based on newer light technologies such as PHP or Python where possible, using an easy to use templating & theme concept. This can facilitate rebranding/repurposing of the scenarios for different interfaces, be it a desktop based or mobile web browser, touch screens or other applications such as immersive 3D environments or applications on phones and PDAs.

A "curriculum" management interface that manages the underlying content, metadata and learning objectives/scenarios is necessary. This interface can be web based to facilitate easy management, and structuring.

Different components can be integrated with a software application supporting the creation of 3D worlds in the resulted architecture. Some of the available solutions, with their advantages and disadvantages are the following:

- Open Croquet (<http://www.opencroquet.org/>) is open source and its communication protocol is available. However, the graphical engine performs poorly, and it is developed using a very uncommon programming language (smalltalks), which could affect negatively in terms of cost and time of development.
- Multiverse (<http://www.multiverse.net>) contains tools for creating and exporting graphical elements, and it consists of communication protocol and interfaces for the interconnection with databases. However, it is commercial and it does not offer tools for user collaboration over documents.
- Project Wonderland (<https://lg3d-wonderland.dev.java.net/>) is a novel product, and it has been developed by Sun under an open source licence. Its communication protocol is already implemented, it offers tools documents' collaboration, and it transacts with various databases. Moreover, it uses JMonkey as graphical engine, a quite mature and stable engine.
- RealXTend (<http://www.realxtend.org>) is quite mature technology, developed on open source products. It offers the opportunity to integrate the

virtual worlds with Skype and development can be based on a Python scripting language. It is compatible with Second Life and it uses Ogre3D as graphical engine.

- SecondLife (<http://secondlife.com>) is a mature technology and its virtual worlds are populated with thousands of users. However, it is not a private network costs for island ownership are necessary in the existing worlds.

3.5 Discovering Similarity in Social Networks using Graph Mining

Graph mining algorithms that discover patterns in social networks can be useful in learning negotiation skills. Moreover, relationships that exist in social networks, web sites and documents can be organized with the use of graphs in order to formulate the interaction among the various elements. Similarity analysis can be applied (a) in tree-like structures to discover similar organizations of components and (b) in more complicated network structures (attributed graphs) to find subtrees or subgraphs of components (e.g., actions) that can be potentially used in various situations of negotiations.

Traditional methods, as well as more recent graph indexing methods, focus strictly on matching graph structure and do not utilize attributes. Other work focuses mostly on exact matching and will return no answer when an exact instance of a pattern does not exist. Some work has been done on inexact pattern matching in large attributed graphs (e.g., G-Ray). One way to model the existing knowledge would be using probabilistic networks that model interactions among nodes using probabilities.

3.6 Text Mining

Text mining has been studied extensively in information retrieval (Berry, 2003), (Weiss et al, 2004). The connection between information filtering and information retrieval has been addressed in (Belkin and Croft, 1992). Latent semantic indexing (LSI) (Deerwester, et. al, 1993) is one of the most popular methods for document dimensionality reduction that has been used in document similarity analysis. The probabilistic latent semantic indexing (PLSI) (Hofmann, 1998) is similar to LSI and reduces dimensionality using a probabilistic mixture model. It has been used quite successfully in document clustering (Hofmann, 1998). Other researchers have studied methods for mining association rules in text databases. A nice overview of text classification is given in (Sebastiani, 2002).

4 EXPECTED OUTCOMES

The outcome of the NEGOTIATOR is expected to contribute to the faster and more effective acquisition of knowledge, competences and skills by the target learner groups, increased productivity based on richer and more effective knowledge transfer, as well as to the establishment of more efficient organizational learning processes. The NEGOTIATOR can deliver:

- Pedagogical socio-productive framework for training the target groups in, profiling, negotiation, crisis management, e-government and service delivery, virtual and public diplomacy, and project management.
- A web based training platform, implemented on open source training platforms (such as Sun Wonderland Project, Moodle, DSpace etc.) or with the combination of commercial products (e.g. the Multiverse)
- A multi-layered ontology encoding knowledge on negotiation, crisis management, foreign affairs, law, e-government and service delivery, virtual and public diplomacy, protocol and cultural affairs skills.
- A language for describing training scenarios in the form of scripts.
- A text mining tool to retrieve and deliver data from web sites and social networks to the training platform.
- A software engine that generates profiles for avatars and groups of avatars automatically, relative to the mining data.
- Educational content and at least three proof-of-concept training scenarios.

The expected impact of the NEGOTIATOR can be summarized to the following: (a) the proposition of an advanced, pedagogically sound system in the areas of e-learning environments, using gaming and desktop VR technologies. (b) The enhancement of both individual and collaborating skills of the learner-groups by focusing on new demands in negotiation and crisis management. (c) The development of diplomatic skills in particular virtual and public diplomacy, and the support of activities in virtual spaces where third countries participate (e.g. the U.S.A., Maldives, etc.).

5 CONCLUSIONS

In this position paper we documented the

requirements of skills in negotiation and crisis management by various groups of professionals. These requirements can be covered with the application of adaptive and immersive e-learning environments, which follow major e-learning principles identified in this paper. We suggested an information system -called the NEGOTIATOR- that follows these principles and combines various state-of-the-art technologies. This information system has been recently proposed as a project under the last ICT call of the European FP7, and it is expected –in case that it will be selected for implementation- to compose a significant case study for the e-learning domain.

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