

Virtual European School – VES

Christos Bouras¹

Dimitris Fotakis¹
Harald Mayer³

Vaggelis Kapoulas¹
Herwig Rehatschek³

Anni Koubek²

¹Computer Technology Institute, Patras, Greece

²Technikum Joanneum, Graz, Austria

³Joanneum Research, Graz, Austria

Abstract

The Virtual European School (VES) is an ongoing European project - funded by the Educational Multimedia Task Force Initiative of the European Union - with the aim to develop a comprehensive on-line resource of teaching material for secondary school education. The system will be fed by a group of smaller publishing houses from different European countries (Austria, Italy, Greece, Great Britain) specialised in educational material. The offer will contain multimedia material, CBT products, and also additional background materials, such as passages from schoolbooks, or Internet resources. The technical structure of the VES system will be based on Internet technologies, with interconnected VES servers in each participating region. The multimedia material will be stored in a database, with multi-lingual annotations for each project. There exist three user groups within the VES: publishers, teachers and pupils.

Keywords: Educational Applications, Multimedia on the Internet.

1. Introduction

The Virtual European School (VES) [1] is an ongoing European project - funded by the Educational Multimedia Task Force Initiative of the European Union - with the aim to develop a comprehensive on-line resource of teaching material for secondary school education. The offer will contain multimedia material, CBT products, and also additional background materials, such as passages from schoolbooks, or Internet resources.

Pedagogically, the VES project aims to reduce instructors' hesitation towards using computers as teaching assistants, by offering an innovative delivery system containing a large variety of material, supporting various pedagogical concepts. All material is adapted specifically for school use by publishers having a know-how of the educational sector. Additionally, VES enables international social contact between pupils and teachers, providing communication tools, educational games and

content designed for shared use as well as distributed virtual environments.

The system is fed by a group of more than 20 publishing houses specialised in educational material. They have the clear focus of establishing a commercial service after a pilot period. The VES system is developed in close collaboration with school educators in order to evaluate contents and architecture. More than 100 schools will be able to participate in the user trials, starting in September 1999. A billing model is being developed taking into account needs of publishers, and also of teachers, pupils and authorities.

The project adopts an outward reaching process, increasing continuously the number of publishers and schools participating in the pilot trials. Once established as a commercial system, VES will be open to content providers on a European level, compliant with the IPR rules set out within the project.

The VES system architecture is based on a network of distributed multimedia databases, which acts as the data servers within the VES. Initially one server per participating country will be installed. These servers can be accessed via a standard web browser. For each user group a special Web-based Graphical User Interface will be designed. Publishers access VES through an interface supporting uploading and monitoring the use of teaching material, teachers have search and compose facilities assisted by intelligent wizards whilst pupils access through a specifically designed interface to work with selected learning material as well as distributed 3D Distributed Virtual Environments (DVEs).

In general the VES system has three main technical objectives:

1. The implementation of a distributed multimedia database for storing the multimedia-value added teaching material and additional CBT products. This database supports multi-linguality regarding annotation of stored material. A thesaurus and an intelligent wizard during the search process support teachers.

2. The development of a 3D multi-user Distributed Virtual Environment providing pupils with a powerful tool for learning and exchanging knowledge. This tool can be accessed from all pupils participating in VES throughout Europe.
3. A sophisticated copyright clearance, billing, and statistical usage monitoring mechanism is being developed in order to properly charge for teaching material.

1.1. Participants

The following organisations participate in the VES project: Bundesgremium des Handels mit Büchern, Kunstblättern, Musikalien, Zeitungen und Zeitschriften (AT), CALL Austria (AT), Anglia Multimedia (GB), Associazione Italiana Editori (IT), Technikum Joanneum (AT), Computer Technology Institute (GR), Joanneum Research (AT), Scienter (IT), Systema Informatics Ltd. (GR), Lambrakis Research Foundation (GR).

2. VES Content

Several factors have to be taken into account in order to deploy educational multimedia successfully in school education. The biggest obstacle for a multimedia content provider is to overcome teachers' hesitation in using new media. Employing new approaches to teaching means additional preparatory work and leads the teachers to only use scarcely a medium, which they are not familiar with.

These problems are encountered by designing new teaching material. The VES project, having a broad basis of schools supporting and evaluating the project development, is taking measures to improve the situation. A main facility in VES is that all content is prepared specifically for school use. Teaching material will be split up into single educational multimedia assets, leaving the teacher the possibility to design her own pedagogical approach to topics.

However, publishers will offer also guidelines, how the material can be used in school-teaching for each grade and subject. Such lesson-sheets can be seen as pedagogical "plug-and-play" solutions, requiring no preparatory effort from the teacher. The lesson-sheets could contain material from different content providers, and additionally topical material, as links to recent online journal articles, related Web sites, etc. The maintenance of this material is an important task within the project, which will provide the synergy between different content providers, general Internet resources and topical themes.

The added value of the VES is that a large variety of material will be available by the publishers, and different pedagogical approaches can be adopted by the teachers. All multimedia material will be filtered by the publishers leveraging their know-how of how information is adopted optimally to school curricula to the new medium.

3. System Architecture

The VES system is based on Internet technologies, which can distribute all kinds of electronic content from publishers among teachers and pupils in several countries. Each participating country runs a localised server of the VES system, offering access to the contents of all servers. These servers are connected with the national school networks. All educational material is stored in a multimedia database with multi-lingual annotations for each unit. Additionally, a three-dimensional multi-user Distributed Virtual Environment (DVE) will be developed to provide pupils with a powerful tool for gathering and exchanging knowledge. The users exploit the VES services via the Internet, using standard Web browsers. Publishers can upload and maintain their content themselves by connecting to their national VES server.

Basic components of the national server are a web server, a communication platform (Distributed Virtual Environments, Chat Service, Newsgroups, Email), a Media Server and the VES Database. The database is replicated within all national VES servers, which makes content searchable at all sites.

Most of the services offered by the VES system will not be free in the commercial system. At the beginning a subscription-based system will be implemented. However, the system will not be limited to that form of billing, other billing mechanisms like "pay per view" are investigated for future use.

3.1. Multimedia Content Units

All multimedia content in VES is organised in "content units" which represent a piece of information not divisible anymore without losing its economic or didactic significance. The idea of VES is to provide really small pieces of information, which can be grouped together into so-called composite units (see below). Publishers are not restricted to the creation and design of their content units by the system. The VES system supports storage of any kind of multimedia content. VES has no restrictions concerning the file formats, however, some guidelines preparing content units are offered.

According to the method of presentation and distribution to the user, VES differentiates following classes of content types:

On-line content: all content types and formats which are directly exploitable by the users through their web browsers and associated plug-ins or helper applications.

Downloadable content: all content types, which have to be downloaded to the local computer of the user to be installed and executed from the local hard disk.

External content: content types which are not stored in the VES system but are available on other media (e.g. CD-ROM, DVD ...) or servers.

3.2. Composite Units

Composite units are structured pieces of information composed of content units and optionally of other composite units. Composite units are used to provide a uniform navigation facility within VES and allow to make use of a content unit in more than one arrangement. This fosters high re-usability and modularity within VES and gives the added value for its users. Composite units are similar to a table of contents in a book and will be created either by the publishers or dynamically by teachers and pupils through searching processes. Composite units may not just contain links to content units but also to other composite units. The different levels are implemented by using recursion.

Teachers can use composite units in order to pre-select content for pupils and structure this kind of content. These structured pieces of information can be offered to pupils later on.

3.3. Metadata

In order to provide a uniform search possibility, each content and composite unit contains a standardised textual description called "metadata". VES stores a standardised set of metadata for each content unit in a database. Since content can be searched in all participating countries, all searchable metadata stored within VES is at least bilingual (native language and English).

Most of the VES metadata are based on categories and attributes of current standardisation activities (e.g. ARIADNE or IMS). This guarantees international information interchange to other systems and reusability of content units. The basic categories of attributes which were necessary to fulfill the user requirements are listed below (some representative attributes are in brackets):

- ◆ General information on the content unit itself (e.g. identifier, title, author, publisher, ...)
- ◆ Semantics of the content unit (e.g. keywords, abstract, ...)
- ◆ Pedagogical attributes (e.g. discipline, kind of material, pupils' age, kind of use, ...)
- ◆ Technical characteristics (e.g. file format, size, ...)
- ◆ Conditions for use (e.g. reserved rights, price, ...)
- ◆ Meta-metadata (meta-author, meta-validator, ...)

For search purposes mainly the attributes within the categories "general information", "semantics" and "pedagogical attributes" are used. These attributes give information on the content unit and enable teachers to decide whether these data are usable for a particular purpose.

3.4. Searching and Retrieving Information

Retrieving content in different ways is one of the most important features of VES, because only a powerful but also transparent searching/browsing facility can guarantee

efficient usage of the system. The VES database can either be searched by using a full text search or by browsing. Basically, VES will provide search interfaces for pupils and teachers, offering the same functionality. In the initial phase of VES database investigation, searching is supported by a series of wizards guiding and navigating the user in the abundance of VES content, allowing him/her to filter out irrelevant, inappropriate and educationally confusing hits.

Since there are content units, which will be restricted to be accessed by teachers only, some results can just be obtained by teachers. Basically, two different search results can be retrieved: content units or composite units. These different types are appropriately visualised in the user interface so that the users can easily recognise the kind of content found. Depending on the type (on-line, downloadable, external), the content units and composite units can then be viewed by using appropriate methods.

3.5. Distributed Virtual Environments within VES

It is evident that VES, apart from the role as an electronic educational repository, is pursuing the role of an educational meeting place for pupils and teachers. 3D Multi-User Virtual Environments - also referred to as distributed virtual environment (DVE) or Shared Virtual Worlds - will be developed, providing pupils with a powerful tool for learning and exchanging knowledge. The VES architecture caters in three distinct cases for the utilisation of such virtual reality technologies:

- ◆ In the definition of a content unit, allowing a virtual world to become a content unit.
- ◆ In the promotion of the utilisation of shared virtual worlds to act as tools for collaborative learning, acting as content units themselves.
- ◆ In the VES communication suite, by allowing an enhanced chat facility in the form of a teacher-to-pupil avatar discussion.

The first two options concern the VES content suppliers (publisher), the third builds an integral part of the VES system. The idea of implementing a virtual reality based MUD (Multi-User Domain), being exploited by teachers and pupils, is underlining the VES system environment. In the planning of the VES-MUD, special sessions are envisaged for teacher-pupil communication. VES is intended to provide the floor for on-line learning sessions for pupils. The society of VES teachers will deal with the learning issues "raised on demand" by organising autonomous shared Virtual Chat Worlds, identified by the "Discussion Subjects" and the "Language Used".

References

- [1] VES – The Virtual European School. Project Programme (Reference Number MM1028). January 1998 (www.ves.eu.org)