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▶ **To cite this version:**

Mircea Giurgiu, Vito J. Carioca, Joao C. Chouriço, Rui Gaibino. OCTOPUS: A Technological Model for Online Resource Centre in Environmental Education. International Conf. on Computer Aided Learning in Engineering Education CALIE04, 2004, Grenoble, France. pp.167-172. hal-00190160

HAL Id: hal-00190160

https://telearn.hal.science/hal-00190160

Submitted on 23 Nov 2007

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OCTOPUS(*) : A TECHNOLOGICAL MODEL FOR ONLINE RESOURCE CENTRE IN ENVIRONMENTAL EDUCATION

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http://www.octopus-eu.org

KEYWORDS: Resource centre online, environment education, e-Learning.

Abstract

The communication focuses on the implementation of an innovative model for creation of on-line resources and e-learning activities on a web platform dedicated to environmental education. All activities take place in the frame of Minerva project OCTOPUS: "Trans-national on-line resource centre". The resource centre implements a mechanism of multi-level knowledge development and information retrieval system using modern electronic tools. This model is dynamic by its technological structure and also from the following perspectives: the resources are dynamically generated, the structure could be easily adapted to other areas, the training resources could be re-used and combined for complex training situations.

INTRODUCTION

The development of an on-line knowledge and training repository together with the associated learning facilities in the multidisciplinary and multicultural area of environment education is the principal aim of the Socrates/Minerva project: OCTOPUS – "Transnational on-line resource centre". Carioca et al. (2002 a) presented the outcomes of this dynamic and content adaptive virtual library: creation of the resource centre of didactic materials as a knowledge pool, creation and customisation of databases in transnational environmental education, production of adequate interfaces for different levels of users and different cultures, searching and evaluation of the resources, creation of complex learning sequences, creation of a virtual space for documentation, interactive learning of a large category of users with different cultural profiles.

In this implementation, the educational model considers two major components which are interconnected by ICT tools: a) one related with the deployment of a very well organized dynamic database which acts as an on-line resource centre uploaded and searched using metadata descriptors as suggested by Norman (2002), and b) one targeting a technological formalisation of new concepts of pedagogical approach for self-training need adapted both for trainers and trainees as described by Carioca (2003).

For the organisation and upload of resources a standardized version of metadata descriptors are used. This information characterise the origin of the resource in terms of: creator,

provider, description, best practices, learning recommendations and it is adapted to the purposes of environmental education. A set of technical tools is currently available for: content tree organisation, information upload, resource management, search and classification, suggestions for learning possibilities, statistics and communication.

The e-Learning possibilities are oriented to learners and teachers in an open and personalized manner. The teaching-learning process is autonomous, collaborative and it is essentially a socio-communicational and technological one based on the next criteria: a) sequential organisation of information, processes and training keys, b) e-Learning tasks promote both self-learning and teamwork, c) evaluation by means of progressive ways and integral perspective.

CREATION OF ON-LINE RESOURCES

For the organisation and upload of the resource a standardized version of metadata descriptors proposed by Dublin Core Metadata Initiative (DCMI) has been adapted for project purposes to the environmental education. Metadata is descriptive information about an object or resource whether it is physical or electronic.

One very important technical feature of this resource centre is the possibility to change at any moment the structure of the content tree. For this, the empowered administrator can add more topics in the main branch or add subtopics in the tree of contents. Figure 1 presents the administration interface for creation of the contents tree. The technical solution offers flexibility in items creation. Also, it is dynamic and can be easily adapted to other areas, such as Geography, Biology, etc. Figure 2 presents how the main chapters of the resource centre may be deeply described: maximum three levels are allowed. The conclusion is that the technical infrastructure of the resource centre can be adapted to other areas and can be dynamically updated. For resource uploading there is a form available on the web, as seen in Figures 3 and it is designed to tag the training material with metadata descriptors. At this moment a number of more than 2000 documents have been uploaded and this number will substantially increase until the end of the project. The form includes in its structure cultural aspects, too, such as: language of the resource, the cultural level required to understand the resource, description of possible intercultural interactivities. The intercultural approach is schematic represented in Figure 4 in order to relate different components in a single and unified vision, which has been recommended to be followed by the content creators in the process of uploading the electronic resources on the web platform.

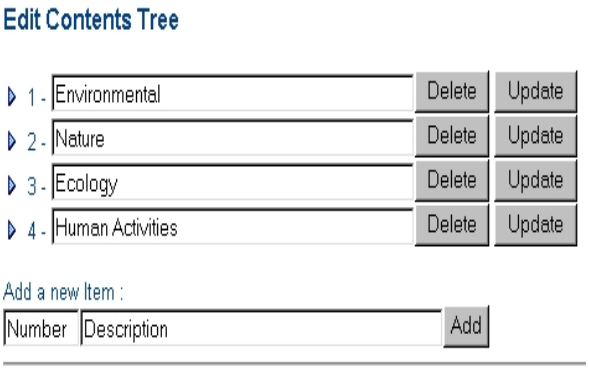


Figure 1. On-line creation of contents tree in Octopus

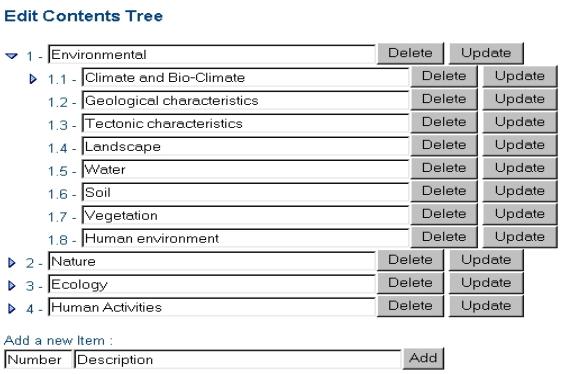


Figure 2. Adding branches to the ”Octopus” centre

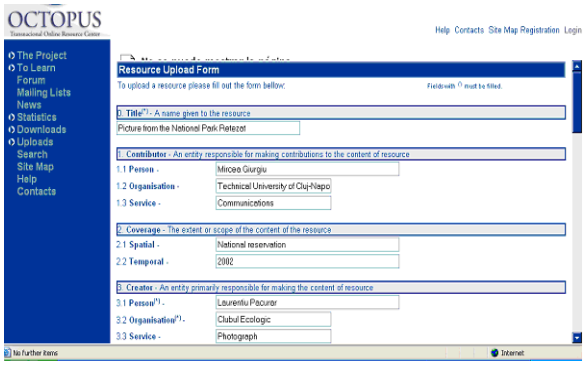


Figure 3. Describing the resources with metadata

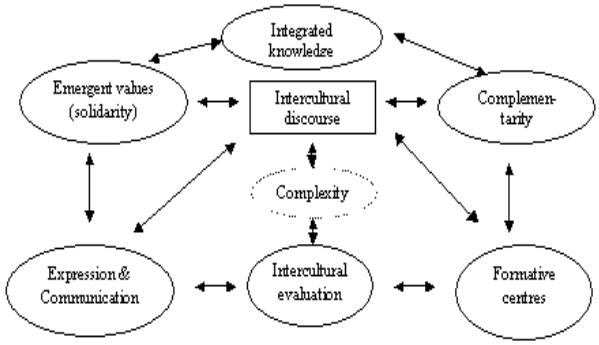


Figure 4. An intercultural approach for training sequences

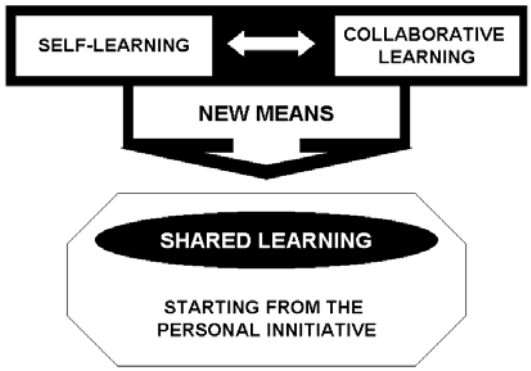


Figure 5. The learning – training model in Octopus

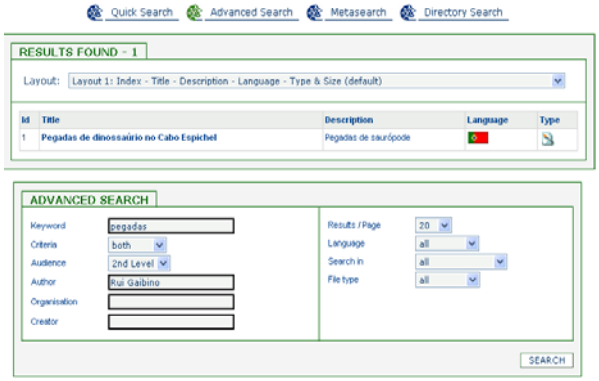


Figure 6. Advanced search of resources

THE PEDAGOGICAL MODEL

The approach is oriented to learners and teachers. Any person that visits the resource centre may be interested to learn more about a topic using a specific resource. The proposal for training is to be open and directed. There is a need to synthesise and complete the different knowledge, valuations, and actuations that are required to base the environmental knowledge and the improvement and integration of the diverse knowledge of subjects in order to create a typology for the learning sequences.

As it is designed, the on-line network is an "ecosystem" that facilitates the interaction and opening of people. The teaching-learning process has to be open, autonomous, and collaborative, as depicted in Figure 5. The on-line creative approach is going to promote the whole knowledge and opening, involving the students in a personal project with other people. The opening has to invite using and enjoying collaboratively all the Internet means. The limited use of restrictions has to stimulate the economical and democratic development of every person who could use it. The opening is real when students and teachers decide to use it freely and autonomously. The active learning allows searching the resource centre with advanced tools such as: quick search, advanced search (as in Figure 6), metasearch and directories search in order to adapt the data source to the needs of the environmental education.

Several pedagogical procedures are proposed for acquisition of the concepts: a) assimilation (present basic concepts of environment protection and relate them with previous concepts, knowledge and experiences), b) accommodation (adjust previous concepts to the new ones

and realise the dimensions of the problem), c) interiorisation (stimulate personal learning achievements), d) bring new ideas (give a personal solution for an environmental issue), e) present personal observations for environment disasters, sustainable development, exchange documents (photos, videos) on a specific theme; f) active participation in solving environmental problems: give solutions to improve the health of environment, elaborate plans and cooperate with others for putting them in practice. These procedures are included in a broader pedagogical scheme that takes into account: working in the class, analyses in the camp, using the resource centre and finally evaluation.

Working in class supposes to use several existing documents from the resource centre for: a) analysis the facts: characteristics of the problem, description of the processes, presentation of images, rough evaluation of consequences; b) interiorise the values: compromise with economic activities, development of intercultural values, scenarios for improvement; c) attitudes: realise the ecologic transformations, implications at regional and global scales.

The direct analyses on the camp are focussing on: guided visits, realisation of documentation, photos, description of the degradation processes, identification of problems, degradation of flora and fauna, experiment ideas, elaborate scenarios, collect the facts, how decision factors may be involved in solving the ecologic problem.

The resource centre is used to: understand the problem, adjust the learning process according to the own rhythm and necessities, facilitate personalisation, realise and active learning, adaptation of the problem to the users, creation of an training agenda, create satisfaction to the user, assessing and encouraging the user.

The evaluation follows the concepts: estimation of actual level of knowledge, analyse the interiorisation process of problems and facts, estimate the vocabulary for describing ecology and ways to improve the quality of environment, analysis of abilities to realize the risks, assess the open tasks.

CREATION OF E-LEARNING SEQUENCES

Starting from an on-line perspective, the learning-training model has to be essentially a socio-communicational and technological one. The activities can be oriented to the self-learning or to interactive-learning. The self-learning activities are based on the autonomy capacity of the learner. With the interactive approach, we ask to exchange information, ideas, or results between learners or between learners and trainers.

A self-learning activity could be a test that includes solutions after the resolution. An interactive-learning activity could be a forum by mailing about a topic or to exchange photos about the pollution. In Figure 7 is presented the schematic formalisation of the creation of a self-learning sequence that involves documentation in the resource centre and specific activities distributed over a time period. The project is decomposed into sub-projects, each identified by a specific goal. The goal may be accomplished by: a) active participation: searching data in the centre, documentation and analyses, experimentations using specific procedures described by the sequence creator; b) informative activities; c) communicative for collaborative learning, such as mailing lists, forum or chat, all realised at different levels: virtual, in the filed or in the classroom. This formalism is embedded into a technical solution. The Figures 8, 9, 10 and 11 present a sequence of screenshots describing activities how to transform salt water into potable water using Octopus resources.

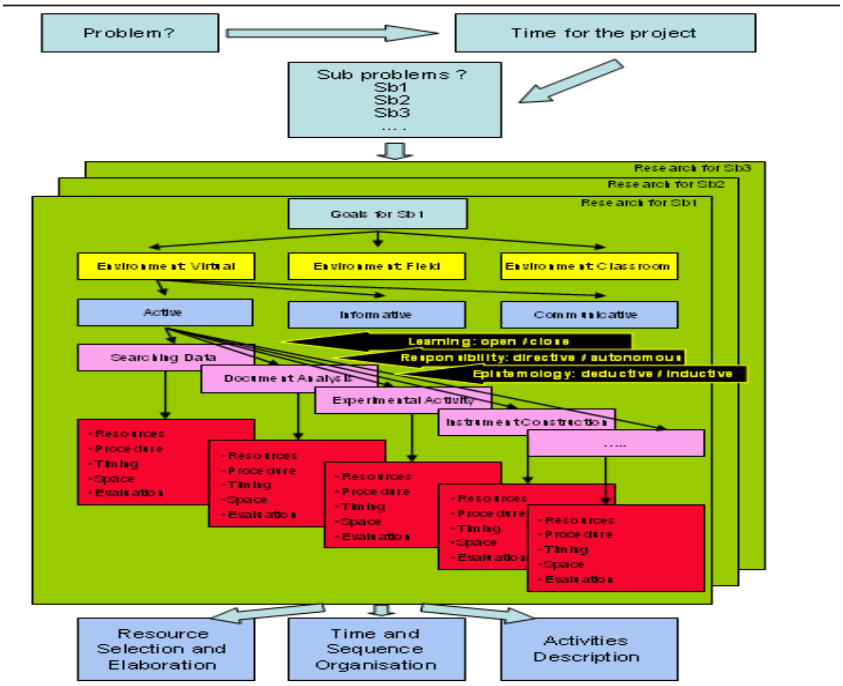


Figure 7. The model adopted for technical implementation of e-learning sequences



Fig. 8. „Project properties“ is the description of project

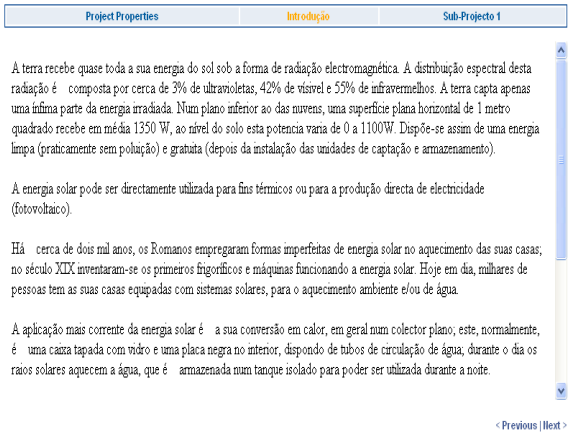


Fig. 9. Introductory section of the project

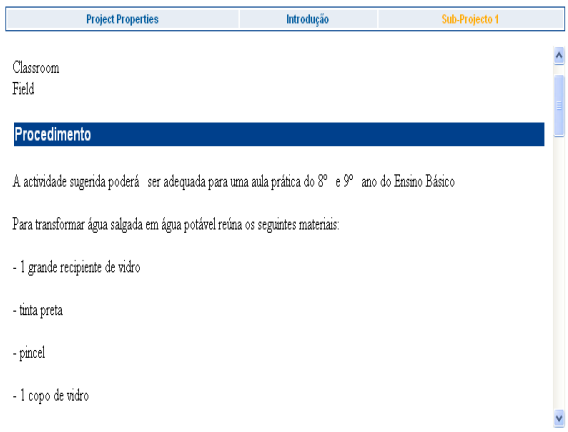


Fig. 10. What is needed to accomplish the project

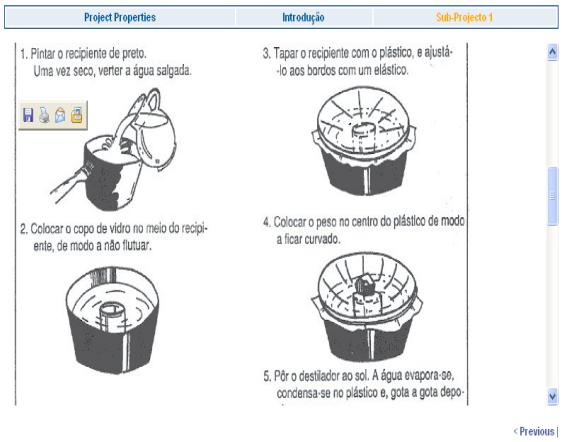


Fig. 11. Detailed scheme of the process

CONCLUSIONS

Creation of on-line resources and knowledge development in the area of environmental education is a complex task involving an interdisciplinary research and implementation efforts. The basis of scientific research and database uploading is the tree of contents together with the metadata descriptors. The educational proposal takes into account intercultural issues that reconsider the methodological aspects of the learning-training processes in order to allow people to build the knowledge by means of the on-line possibilities. Both, resources and learning facilities of the resource centre are the subject of continuous improvement and expansion, creating in this way a very dynamic dimension of interdisciplinary and intercultural knowledge pool over the web.

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(*) NOTE: This project is implemented with the financial support of the European Commission within the Socrates/Minerva Program 90120-CP-1-2001-1-Minerva-M-PT. The content of this paper doesn't necessarily reflect the position of European Commission.