Knowledge Repositories for Rural Communities of Learning

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Abstract. Knowledge Repositories can be a potential solution in order to cover agricultural professionals' lifelong learning needs. An application area of particular interest is the one of digital learning repositories (LORs) which are digital repositories that are created in order to provide access to digital educational materials and the nature of their content or metadata reflects an interest in those materials being used in an educational context. In such repositories, educational metadata play an important role since they allow the description and categorisation of learning resources using widely-accepted, interoperable and reusable metadata specifications and standards. In this initial stages of my PhD research, we study the design of appropriate educational metadata for LORs that aims to support vocational training of small and medium enterprises (SMEs) communities in rural areas and also we will develop a final repository system. Finally we will identify the lines of initial stages of my PhD research based on the convergence of these areas and we will outline the proposed directions of this research.

Key Words: *Agricultural Education, Knowledge Management Systems, Learning Communities, Metadata.*

1. Introduction

Information and telecommunication technologies have greatly enhanced access to learning for people living and working in rural and remote locations, which are unable to attend campus-based institutions. This fact has been widely recognized by both learning institutions and rural and remote communities for many years [1].

Even today, that we can approach knowledge more easily, still there are special groups of people that cannot reach knowledge or hesitate to approach it. One characteristic case is the rural sector, where specialists (e.g. agriculturist) and also the final receivers/enterprises (e.g. farmers) in Greece, cannot have access to this knowledge. The country's geography, with thousands of islands and varied morphology all over Greece makes traditional learning methods to be hardly adjustable, especially to these educational groups.

A study of USDA Agricultural Resource Management [2] shows that 55% of farmers had PC and 43% of farmers had connection with the Internet in America. A study from UK Department for Environment, Food and Rural Affairs [3] shows that in UK

60% of farmers had PC and 23% connection with the Internet. A national research for ICT use in Greece shows that 34% of SMEs have PC and only 18% use internet.

In this part, we should add in order to understand the meaning of knowledge technology not being concluded in the agricultural field and the importance of the agricultural field in Greek and European economy. The rural sector participates in his employment of one fifth almost active population, (opposite 6% in the E.C. (European Community)). The Greek farmers exceed the 10% of farmers of E.C., the moment while the population of our country constitutes hardly the 3% of population of the E.C. The rural sector contributes in the 12% of G.N.P. (Gross National Product) and possesses the 30% of total of exports of our country. More specific the Greek plant products constitute the 6.3% of E.C. plant production, and animal cover the 2.5% of E.C. animal production [4].

Internet increasingly becomes a dominant medium for learning, training and working, and learning resources are continuously been made available online in a digital format. There is a foreseen potential for agricultural stakeholders, such as small and medium enterprises (SMEs) in rural areas, from having access to such online resources. Agricultural stakeholders represent groups of potential learners with particular educational needs, which require them to be continuously trained on new topics and subjects.

The aims of this PhD project research are:

1. To develop a LOR for agricultural users.
2. To facilitate creation of several pilot online learning communities of agricultural actors (SMEs from the business sector of agriculture and new farmers).
3. To execute evaluation experiments on the use/adoption of the LORs from the pilot communities.

2. Problem domain and research questions

A new farmer should know how his professional environment will be. The factors however that influence long-lasting the international and E.C. agriculture are so fluid that any forecast becomes impossible. We can however appreciate that the progress of technology and biotechnology will involve increase in the offer and in the variety of rural products. While by the side of demand is expected increase because doubling of population of ground. The Greek agriculture faces today the challenge to be adapted in a particularly difficult and permanently altered international environment. For this Greek agriculture should overcome structural weaknesses and develop its comparative advantages.

The prospect actually is found in the new farmers and we speak substantially for a new generation of farmers which have in their disposal more enterprising motives, the possibility of acquisition, of viable exploitation and mainly more knowledge from the older generations. Perhaps the most important supply for a new farmer is information and that is because as a businessman he should know the market, the possibilities that are offered to him through programs, but also to be informed on time, for the development of new technologies and new cultures or methods of culture. Right and

convenient information gives the possibility of taking right decisions and drawing in the long run. The season where the farmers without education, transmitted the knowledge and their experiences orally from generation to generation has expired. The current requirements are high and require high agricultural education.

All this changes affect also the agriculture universities which must face the challenge of providing education based in the rapidly growing, increasingly global, and highly technological food, fiber, and natural resource system [5].

The learning environment for agricultural students is as difficult as the teaching environment for agricultural faculty. Generally distance education students are older and are coordinating various job and family commitments with their learning opportunities [6]. Obviously they don't have as much communication with each other as in a traditional class and they are forced to rely on the technology and their good knowledge of it in order to complete the online course successfully.

Educational metadata play an important role in LORs, since they make access to the learning resources faster, easier and more effective. To support the development of LORs, using recognised metadata standards is important for a variety of reasons: metadata descriptions may be exchanged among different LORs, search queries may be propagated among different (and interconnected) LORs, and generally the integration of data from different sources is facilitated. An issue that requires particular care when developing LORs for agricultural and rural stakeholders, is the fact that learning resources for such learners have to reflect and match their special requirements (e.g. linguistic preferences, regional geographical coverage, particularity of covered topics, and educational level of addressed audience). This calls for the development of standard-based, context-specialised metadata when building LORs for agricultural and rural stakeholders.

Identifying problems:

1. Unexploited opportunities offered by Technology Enhanced Learning (TEL) and LORs in specific.
2. Late adoption of LORs from agriculture actors.
3. The existing pilot studies that do not cover all the parameters of TEL applications in agriculture.

So the research questions are:

1. What specific design and development is required for agricultural LORs?
2. What kind of learning communities can emerge?
3. How useful/effective do the community members find the integration of LORs in this learning activities?

3. Methodology

3.1. Creating LOM Application Profiles for Agriculture

A common vision that may serve as an enabler for sustainable development,

environmental preservation, and fighting hunger in the world, is the involvement, collaboration and coordination of activities dealing with the production, organisation and exchange of agricultural resources. In this direction, initiatives such as the Agricultural Information Management Standards (AIMS) of the Food and Agriculture Organisation of the United Nations (FAO) have been launched to involve as wide a sector of the agricultural community as possible [7]. The use of agricultural metadata standards makes it easier to integrate data from different sources allowing for creation of value added services such as simple aggregated subject-based views, automatic news feed services etc. Important results have been produced as an outcome of this collaborative effort, and are already put in practice around the world.

There have been several approaches in developing educational metadata schemas or application profiles for agricultural learning resources. Several approaches are application profiles of the IEEE LOM standard. For instance, the CGIAR LOM Core has been created by the Consultative Group on International Agricultural Research (CGIAR) in order to describe its learning resources in a manner that best suits its content, purpose and audience [8]. Another IEEE LOM application profile if the one from the Bio@gro initiative [9] which was created in order to categorise available online educational resources that are related with Organic Agriculture topics. A recent approach is FAO's Learning Resources Metadata [10], which is based on Dublin Core metadata standard [11], also borrowing some elements taken from IEEE LOM.

3.2 LORs with agricultural Repository development

Our aim is the design of a LOR that it will focus in education of SMEs of rural sector of region and new farmers. For this aim a web based repository will be developed and afterwards a network environment for access and search in the content of this repository. The system will include advanced search of learning objects, which will be based on the experience of previous users (as this it has been recorded in the evaluations that will be available in the web based system).

3.3 Content that experts will populate

Then experts will give content on using e-services for farmers and other small entrepreneurs of rural areas, and content on agricultural and geosciences topics for young agricultural experts and students of agricultural universities.

3.4 The Community Environment

Our next step is to use existing communities that will use the system for their educational needs. For this reason we will locate existing communities and then we will go over these communities trying to find out their special characteristics and their educational needs. These communities will constitute the sample of our experiment and they will include SMEs from the business sector of agriculture and new farmers. A recent research on these groups has shown that 55% of these groups classify themselves as having either a very good or good PC skills. Also 56% considered that they had either a great deal or a lot of internet experience and 63% had a broadband connection [18].

3.5 Design and execute pilot testing in selected communities

Afterwards some pilot trials with real users will accomplished, and results will be collected and analysed, in order to trace a control mechanism of old users' choices. Then it will provide in the users indications of appropriateness and usefulness for the training objects of the repository.

4. Progress so far

At the time of writing, the most developed PhD research has been done in the field of existing LORs. A survey of 59 well-known repositories with learning resources has been done and their characteristics have been examined [12]. From them a set of 27 covering agricultural topics have been identified. The results of this study revealed that there are indeed LORs that offer learning resources that are of interest for the agricultural actors. The main topics covered are agricultural and forestry equipment, agricultural chemicals, agricultural systems, agricultural waste, agronomy, biotechnology, cultivation and harvesting, environmental impact of agriculture, farm and horticultural structures, farm diversification, organic farming etc. This initial PhD research gave us the opportunity to formulate a general picture about their nature and status of development of the most well known existing LORs. The contributions so far in this direction can be considered so far rather sporadic, focused on very particular topics, or restricted in coverage. This is also shown and from the fact that from 881000 resources only 3200 have a direct relation with agriculture [13] [14] [15] [16] [17].

Currently we are going to develop a LOR with resources for the vocational training of rural SMEs on e-Government services and technologies, allowing users to search, locate and access listings of training resources. This requires the development of an appropriate metadata schema that will implemented to support LORs functionalities. For the description and classification of the Learning Objects of the LORs, an application profile of the IEEE LOM standard has been developed. More specifically, an IEEE LOM application profile is proposed with particular attention to language, audience and classification according to our community needs.

5. Discussion and Conclusions

In this research we present the general plan and the initial work that has started being carried out in my PhD. The main goal of our work is to develop a LOR specially design according to agricultural users needs. We also plan to facilitate creation of several pilot online learning communities of agricultural actors in order to execute evaluation experiments on the use/adoption of the LORs from the pilot communities. The suggested solution is different because there are no similar studies in the field of evolution and also there are open research questions at the development of agricultural Application Profiles for Learning Resources (FAO).

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