

A structured e-learning project for sericulture training as a perspective in development policy of Less-Favored Areas

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Jel classification: Q160, Q 180

1. Introduction

Recent developments in network technology have resulted in a wide variety of common everyday applications supported through the WEB for efficient information transactions among many users. Information and Communication Technologies (ICTs) support products and services with integrated possibilities for data handling and networking (Hopkins, 1994; Walrand, 1997; Andreopoulou, 2000; Papastavrou, 2001). New technologies offer educators a new medium to deliver teaching and learning material through new exciting ways of learning. The new alternative to the traditional teaching techniques can allow flexibility in the learning process and it can cope with a wide variety of backgrounds and trainees qualifications.

The Internet age has affected education and learning has become an ongoing process, the population of learners has grown, flexible learning is demanded in time, place and pace and finally, the acces-

Abstract

The Web applications are rapidly improving and they allow telematic activities through inexpensive and easy-to-set-up networks as e-learning activities. This paper describes the development of a structured e-learning project for training of local populations in sericulture techniques in Less-Favored Areas, such as the remote area of Soufli in Evros prefecture. The unemployment rate is high, especially for young people. Consequently, the Internet-based e-learning applications can be developed to train unemployed groups in traditional and new techniques and in management basic concepts to finally promote commercial activities, in particular in the sericulture sector. A general outline is given of the e-learning perspective through the Web, of the proposed structure for a Web-based courseware, of the design and implementation of the infrastructure needed locally. In addition, the thematic units are briefly presented. E-learning projects can support e-communication between trainees and instructors via e-mail and online conferences in combination with the submission of assignments and the participation in real-time e-tutorials from specialists. The structure model that combines Web-based learning environments and tele-conferencing for training purposes could be a valuable learning tool and a high motivation for people in the region to use local resources in order to increase their income and enhance local development.

Résumé

Les applications du WEB ne cessent de s'améliorer et elles permettent de réaliser des activités télématiques à travers des réseaux peu coûteux et faciles à mettre en oeuvre comme, par exemple, les réseaux de formation à distance. Dans le présent travail, on parcourt un projet structuré d'e-apprentissage pour la formation de la population locale en sériciculture dans des régions défavorisées de la Grèce, comme la région éloignée de Soufli, située dans la préfecture d'Evros. Le taux de chômage est élevé, en particulier parmi les jeunes. Par conséquent, la population locale pourrait bénéficier grandement du système de formation à distance pour apprendre les techniques traditionnelles et les plus avancées utilisées en sériciculture ainsi que des principes fondamentaux de gestion en vue de promouvoir des activités commerciales dans la région. A cette fin, on décrit une possible application de la formation à distance, comment structurer un cours sur le WEB, comment concevoir et mettre en place les infrastructures nécessaires. En plus, on passe brièvement en revue les unités thématiques. Les projets de formation à distance peuvent permettre la communication entre l'apprenant et le formateur sur le WEB, des conférences en ligne, l'envoi des travaux écrits et la participation en temps réel des spécialistes à l'apprentissage interactif. Le modèle de structure qui combine l'apprentissage par voie électronique et les téléconférences pour la formation pourrait être un instrument utilisable à des fins pédagogiques et pour encourager la population à mieux exploiter les ressources existantes dans le but d'augmenter le revenu et finalement, de promouvoir le développement local.

sibility to education is strongly demanded. The Internet and the Web-based applications are considered of utmost importance for education improvement, in particular to extend the reach of education beyond the physical classroom setting (Michaels and Smillie, 2000; Miller, 2000). The new paradigm creates great opportunities for both educators and learners in terms of accessibility, flexibility and in some cases, also cost, since instruction is delivered via all electronic media including the Internet, satellite broadcasts, audio/video tapes and CD-ROMs (Govindasamy, 2002). New learning environments have been developed mainly for asynchronous learning with Web-based instructional activities, while tele-conferencing systems have been used for synchronous activities and allow delivery of instruction to populations that otherwise would not benefit from such resources (Porter, 1997; Pond, 2002; Beyth-Marom et al., 2003).

Telematic services provided by ICTs through improved networking can assist to fulfil the regional and local sustainable development goals, since telematic services can be addressed in order to improve both access and education

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through various activities. At present, Web users can benefit from telematic services that provide and enhance e-communication such as e-learning, e-working, e-commerce, e-medicine, e-banking, etc. (Andreopoulou, 2004).

The impact of telematic services on education and training is only just beginning to be acknowledged. There are several advantages resulting from e-learning, such as a higher quality of education, enhanced life-long learning, easier access to information on the Web, the availability of quality information, the ability of the Web environment to stimulate the students' interest, the promotion of engagement and communication between the students and the instructor that become more frequent and productive including exchange of information and ideas, the recognition of the Web value for learning, the evolution of traditional types of learning, etc. (Rovai, 2002).

E-learning or distant learning can support the education and training of people in remote and/or mountainous areas with interactive sessions between the instructor and the attendees. Accordingly, knowledge can be properly disseminated since e-learning training projects render time and place irrelevant. Local populations can be adequately trained in new techniques and practices that otherwise they would not be able to learn, due to the distance, the unfavorable weather conditions, the transportation cost and the loss of valuable time needed. Instructors can be more than one in order to globally cover the seminar subject. Furthermore, structured e-learning projects enhance learning through the combination of telecommunication, information and multimedia technology and applications and thus produce two results: at the educational level, that is the improvement of the existing learning methods and the development of new ones and on the technological level, in so far as the ICTs provide new distance learning applications (Bouras et al, 2000).

In Greece, rural areas with sensitive ecosystems and special geomorphology exhibit some major disadvantages as regards the innovation of production structures and the implementation of contemporary activities, mainly due to inefficient infrastructure and services. An evident result is the population shrinkage and the relative economic, social and environmental degradation (Koutroumanidis et al., 2001; Andreopoulou et al., 2002; Arabatzis and Christopoulou, 2003). At the same time, the inadequate protection means lead to the degradation of the local environment because of illegal activities of the local population. (Arabatzis, 2003). In these areas, classified as Less-Favored Areas (LFAs), the development strategy aims at the well-being of the local population in economic, cultural and social terms.

The categories and the criteria for the classification of LFAs are defined by paragraphs 3-5 of the Directive 75/268, then by the articles 17-20 of the Regulation 2328/91, the articles 23-25 of the Regulation 950/97 and the Regulation 1257/99. More than 32 application directives define LFAs in each European Member State. There are three LFA cate-

gories: a. Mountainous areas, where the altitude and relief tend to decrease the productivity of the land, b. Other less favoured areas, characterized by the low soil productivity, the low income and the decreased population, and c. Areas affected by special disadvantages related to the environment, landscape development or coastal areas and islands where it is necessary to preserve agriculture to maintain the rural environment.

The policy for LFAs has integrated a spatial/geographical aspect, while combining economic, social and environmental objectives. LFA policy aims at: a. counterbalancing the effects of the permanent natural inferiority in the cost of agricultural production, b. facing the rapid population decrease in agriculture and in the rural areas, leading to the abandonment of agricultural lands, and c. protecting and preserving rural areas and the agricultural environment. The support to LFAs has to cover the various regional needs of European agriculture, related to the socio-economic conditions and to the natural environment in the different rural areas.

Concerning LFAs, the EU Common Agricultural Policy (CAP) refers to the need for planning and promoting proper methods for rural production along with environmental aims and the preservation of natural resources, as a means to keep the local population. As a result, environmental awareness and the various LFA features should turn into assets to support local development. The recognition of these special features and environmental sensitivities, through a proper planning policy, can finally lead to the allocation of funds to promote actions on a regional and local scale (Papadopoulos and Liarikos, 2004). Although LFAs are usually the last to benefit from infrastructure development related to telecommunications, the impact of the new technologies on everyday life in Greece has been so intense in the last decade that access to the Internet and telecommunications has greatly increased all over the country.

Hence, distance learning or e-learning activities can be a useful tool for development planning because distance, time and cost are not significant factors in the flow of information and knowledge. E-learning activities should not be compared to traditional education and training but they should facilitate a new form of learning that uses technology in an innovative manner. However, training of local people can help them earning an additional income and learning effectively new, modern techniques and re-inventing old traditional practices to apply to their occupation.

Through proper training sessions by specialists, people could understand the value of local resources and become aware of the need for environment protection and sustainable development.

This paper reviews the application of e-learning network services in less-favored areas within the development planning process. The LFA community of Soufli, in the Prefecture of Evros in North-eastern Greece, has been selected as case study. Section 2 presents the methodology used to col-

lect and organize the data necessary to assess the need for training of the local population in order to face unemployment issues. The results are presented in Section 3 and they concern the population distribution into age groups, their education profiles and the unemployment rate. Section 4 defines the targets that should be achieved through the training seminars, outlines the thematic units that meet the needs of local training projects, describes the structured e-learning perspective aimed at the Web, presents the proposed structure for a Web-based courseware and illustrates the design and implementation of the infrastructure needed locally. Finally, Section 5 examines the results and their usefulness and includes a summary of the conclusions drawn.

2. The Case study area

The municipality of Soufli is a remote and less-favoured area, located in the middle of the prefecture of Evros, in North-eastern Greece. The area is characterized by a low population density, small agricultural ownerships, livestock production and is close to the Evros river, the natural boundary with Turkey. The unemployment rate is very high, especially for young people and the difficult weather conditions even worsen the situation.

The area is characterised by a high percentage of mountains which cover 24,700 Ha, namely 53,4% of the total available land of the municipality. The forest cover is significant on the mountains and it also stretches over most plains. The forest cover consists of 29,150 Ha, that is to say 63,1% of the total available land of the municipality of Soufli.

Land available for agriculture comes up to 6,330 Ha that is 13,7%, of the total land and consequently, farming activities are quite limited. A high percentage (20,7%) of the available land is represented by pastures. As a result, the extensive pastures and the limited agricultural land, unsuitable for intensive farming, can be the favourable conditions for the development of sericulture in the area.

Greece has a long tradition in the sector of sericulture which was flourishing in the past, as regards production and processing (Doulias, 1995). Sericulture comprises mulberry plantations for the production of leaves, silkworm breeding for the production of cocoons for silk and silk processing. However, after the international sericulture crisis and retrogression, the main area in Greece where such an activity is still thriving is the area of Soufli in the Prefecture of Evros. The future of sericulture in Greece generally, and more specifically, in Soufli, seems promising because the Greek Government and the European Union have adopted an encouraging policy through financial incentives for the establishment of mulberry plantations, silk worm breeding and improvement of processing units.

3. Materials and methods

In the year 2000, a research work was conducted in the municipality of Soufli to gather information about the population, concerning the distribution in age groups, the

unemployment rate according to age groups, the education profiles and the outflow rates.

The data collected refer to the population of Soufli in the year 2000 based on a sample of 96% of the total population, since it was impossible to register 70 households that account for 250 persons (Municipality of Soufli, 2000).

Data were analyzed and organized in tables to assess the need for training of the local population in order to face unemployment issues.

4. Results

The survey results refer to the basic demographic characteristics of the population in the municipality of Soufli.

The following tables (Table 1 and Table 2) show the population distribution in the community of Soufli according to age groups separately for men and women. In the last

Table 1. *Distribution of men in age classes*

Age classes	Men 2000	
	Persons	%
0-14	378	13,9%
15-29	466	17,1%
30-44	563	20,7%
45-64	686	25,2%
65+	630	23,1%
Total	2.723	100%

Table 2. *Distribution of women in age classes*

Age classes	Women 2000	
	Persons	%
0-14	370	13,1%
15-29	462	16,4%
30-44	510	18,1%
45-64	714	25,3%
65+	764	27,1%
Total	2.820	100%

Table 3. *Educational level for men and women*

Educational level	Men		Women	
	Persons	%	Persons	%
Illiterate	46	2,1%	85	3,7%
Elementary school	1.272	56,8%	1.453	62,4%
High School (9 grades)	224	10,0%	197	8,5%
High School (12 grades)	436	19,5%	385	16,5%
Technological Institutions	129	5,8%	94	4,0%
University	130	5,8%	114	4,9%
Post-graduate	4	0,2%	1	0,0%
Total	2.241	100%	2.329	100%

Source: Local Development Program of Soufli, 2000

Table 4. *The distribution of the economically active population in men and women and their educational level*

Educational level	Men		Women	
	Persons	%	Persons	%
Illiterate	16	1,1%	15	2,2%
Elementary school	665	45,8%	271	39,4%
High school (9 grades)	177	12,2%	59	8,6%
High School (12 grades)	364	25,1%	185	26,9%
Technological Institutions	116	8,0%	69	10,0%
University	111	7,6%	87	12,7%
Post-graduate	4	0,3%	1	0,1%
Total	1.453	100%	687	100%

Source: Local Development Program of Soufli, 2000

decade, the male population for the 15-29 age group has decreased. Sixty-nine per cent of the male population includes men over 30 years. Table 2 shows that women over 30 account for 70% of the female population, similarly to the men percentage.

Table 3 illustrates the education level of men and women in the area of Soufli, for the year 2000. More than half of the population (59,5%) has attended the elementary school and only a small percentage (0,1%) continues with post-graduate studies. The female population exhibits a lower education level since 62,4% of women have only finished the elementary school. The illiteracy percentage is 3% and the number of illiterate women is almost double (85) compared to men (46).

Table 4 presents the distribution of the economically active population registered in the year 2000 for men and women and based on their education level. They are mostly elementary school graduates: 45,8% of men and 39,4% of women. Women with a higher education degree and belonging to the economically active population are more than men (22,8% versus 15,9%)

Concerning the outflow percentage, table 5 shows that most of the population left the community in the 80s (66,8%) and since then the population outflow has progressively decreased until the end of the 90s.

The aforementioned tables clearly indicate that unemployment affects both men and women in the area.

Table 5. *Outflow of the population*

Decade	Persons	%
Until 1969	124	9,8%
1970 - 1979	297	23,4%
1980 - 1989	427	33,6%
1990 - 2000	422	33,2%
Total	1270	100%

Source: Local Development Program of Soufli, 2000

5. The structured E-learning project

The enhancement of sericulture activities is the general objective that is served through the planning and materialization of structured e-learning activities, both synchronous and asynchronous.

In the synchronous type, the focus is on the Web applications via Internet or via ISDN broadband transmission for audio-video teleconferencing, that is an online e-tutoring of basic concepts, practices and techniques for sericulture. Networks and their applications provide the means to cover the instructional gap when the instructor and the trainee are in different locations (Porter, 1997).

In the asynchronous type, e-learning focuses on applications based on the Web-page environment through the Internet, that still remain interactive through a proper design. Asynchronous e-learning comprises Web lectures, Web seminars, Web training and also Web examinations. In these paperless courses, trainees use computers in a local teleclass, a specially equipped room for e-learning activities, whenever they have spare time, to obtain all the knowledge and "know-how" they need and as many times as they need.

In a structured model for e-learning training seminars, during Web lectures the trainee has access to the teaching material available on the Web, which makes learning more real, interesting and dynamic than it was possible in the past, and yet, stimulates the student (Mann, 1998). Training in a Web-based learning environment allows communication with the instructor and the other trainees through the e-mail and e-conferences, the online evaluation process, the online or via e-mail submission of assignments and also, the interactive participation in e-tutorials. However, traditional paper-based educational material is also available for the trainees in combination with any other audiovisual assistance.

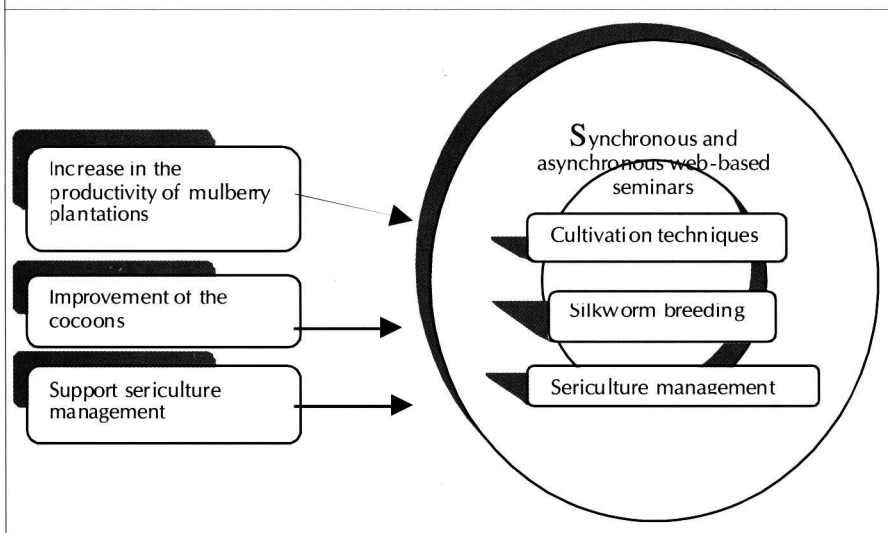
The adaptation of the new alternative education form is not always successful and it is not perceived in a common style (Lee, 2001). Although research evidence suggests that distance learning programmes provide a high level of satisfaction through the flexibility of time and space and the focus on interactive (Arbaugh, 2000), high drop-out rates and the low quality of learning attainment as perceived by both instructors and students are two major issues (Bernard and Amudsen, 1989).

5.1. E-learning in the Development Policy

Some of the major targets in local development must be the substantial increase in the local budget and the promotion of commercial activities. All in all, less-favored areas constitute a complex and productive domain; however, to keep the local population, it is necessary to support the development of several activities and not to be limited to agricultural activities.

In particular, in the area of Soufli, e-learning projects should focus on the training of local population and also on

Figure 1. Basic aims fulfilled with e-learning seminars for sericulture



the motivation of professional opportunities for them. The revival of sericulture could create an attraction pole for old and new producers and represent a serious development tool provided that the following innovations are planned and implemented:

- a. Increase in the productivity of mulberry plantations;
- b. Improvement in the techniques for silkworm breeding and consequently, improvement in the cocoons quality;
- c. Support to scientific and administrative management in sericulture.

Each of the above targets can be achieved through the preparation and organization of a properly designed e-learning seminar for local farmers (Figure 1).

In order to achieve the first target, an e-learning seminar can be organized for proper training of the potential producers in some activities such as applying the right planting distance, trimming, fertilization and plant protection to exploit at best the mulberry leaves produced.

The second target can be supported by planning e-learning training seminars for potential producers to adapt new and improved techniques. These techniques concern the improvement of environmental conditions, through a proper preparation of the breeding sites, the maintenance of appropriate conditions during breeding as well as the improvement of cocoon nutrition.

The third target can also be achieved by planning e-learning seminars to up-grading the technical education of the professional members involved i.e. foresters, agronomists, silk producers. Furthermore, a technical education Institute in the area, under an organized national guidance, will be in charge of training properly technicians for sericulture. These technicians will play the role of consultants for producers. The technical education is today non-existent and therefore, sericulture is merely based on the application of traditional experience which, however, can not meet the present needs of this sector.

5.2. Structural aspects of Web-based e-learning courseware

The Internet will be the backbone for the delivery of the needed courseware in a flexible, interactive, multi-media form. To prepare the hypertext material for a web-based course, developers – either instructors or technicians- have to make the proper design decisions for the final training product that are related to issues concerning the hypertext. Since the Web-based courseware addresses groups of unemployed people in the community of Soufli, with a given education profile and computer literacy, the design should be appropriate.

Nonetheless, any previous education technology should be integrated in the e-learning process. The hypertext environments implemented on the WEB can support e-learning activities in various perspectives.

The interactive character of e-learning sessions for training purposes is an advantage compared to a videotaped or TV presentation; the attendees can intervene for questions and explanations, more or less as it would occur in an actual classroom. Multimedia technology supports the instructors with a variety of audiovisual devices to serve the presentation and to keep the interest of the audience.

The educational material in the hypertext version can be structured in four basic perspectives, the presentation of knowledge in conceptual form, the use of examples, the exercises for the trainee and finally, the establishment of communication between trainees and the instructors. The existing conceptual material to be taught during e-learning activities is usually found in textual form and it should be converted into a value-added hypertext version. The original teaching material in the form of books or notes is usually structured in units and their subdivisions that serve a specific learning objective. Their conversion into hypertext structures provides, in addition to knowledge, an interactive mechanism between the trainees and the educational material, which can support different pedagogical activities in the learning process. This will finally lead to enhancing knowledge, whenever the appropriate technology is utilised for each pedagogical activity.

The main goal for converting the teaching material into a hypertext format is to provide a much richer environment for the trainee in order to facilitate flexible and individual learning.

The educational material should integrate excerpts of relevant texts with the basic concepts, detailed pictures, videos for teaching practices, narrations, even music in combination with group interactive sessions in the local tele-class.

Examples should consist of case studies, usually of short length in the form of text, graphic, video, etc. and assist in a better comprehension and integration of knowledge primarily given in a conceptual form. Exercises for groups or self-tests aim at the effective application of the knowledge acquired in the previous steps, reinforce the learning process and allow the application of certain methodologies and practices. Finally, communication is enhanced between teachers and trainees through e-mail facilities, bulletin boards containing announcements, establishment of chat rooms and discussion groups (Ipsilandis et al., 2003).

Other hypertext techniques, that should be utilized where appropriate, can be hypertext links either internal or external, navigation techniques to support access to facilities, such as maps or a keywords index, mapping techniques with site maps to visualise the document structure and to reduce disorientation, animation and video.

In a Web-based courseware format, the final product should also be updated continuously, with the enhancement of the educational material and the incorporation of any new technological advance in the design of the WEB pages as new technologies become available.

5.3. Implementation of the local tele-centres

The infrastructure needed for education and training sessions already exists in most Greek universities, institutes, etc. to support the instructors. Software technology provides all the necessary tools for the design and implementation of e-learning training sessions, for both the instructors and the trainees.

Local tele-centres act as the basis for the training of local population. However, an important factor for the materialization of e-learning projects for the local population is the development and equipment of the local tele-center with the appropriate hardware and software. This is usually a room in the administrative center of the community or a local school computer laboratory, in order to already have the proper equipment and infrastructure needed to be functional, such as telephone lines and computers. Secondly, apart from training activities, these tele-centres can potentially support e-commerce for local commercial activities, communication, information retrieval and productive activities as in tele-working activities.

Administrative community centers are the most appropriate places to set up regional tele-centres which will be used as tele-classes. Local people are familiar with the administrative premises and they already consider them as the centre of local development since all administrative activities take place there. They are usually located in communities with convenient access from the rest of the area and it is easier for people to go there to attend the training sessions. However, in most community centers the basic infrastructure i.e. telephone lines, computers, printers etc. already exist. Usually, the community assembly room can be properly

organized as a teleclass. The equipment can be used for the needs of the local authorities as well. Hence, community or local sources can fund the implementation of tele-classes.

In order to use these tele-centres for real-time lectures given by specialists within training sessions, the basic structure of a real classroom is kept, thus the area of the audience is usually placed opposite to the area of the instructor. The necessary equipment consists of the basic hardware (computer, network connections, monitor, camera), the software for applications and the Internet access, in combination with any peripheral device needed for training sessions. Integrated solutions and commercial service packages are also available, both hardware and software, to support interactive audiovisual communication between two places.

Peripheral devices consist of alternative data resources that can be presented and watched in the teleclass by the audience in a real-time online lecture. The picture and sound that are presented each time to the attendees are also displayed on the computer monitor. The various peripheral devices which can be used are: a. Camera for the instructor, b. Microphones, c. a video projector and a white screen, d. a document camera, e. an electronic whiteboard with touch surface, f. a VCR, CD or DVD device for the presentation of ready-taped educational material, g. a Slide projector and h. a special tablet, a device with many buttons, which is used for the manipulation of all the above devices, and a pen for their selection.

The classroom should not contain material that creates light reflections, it must be properly equipped for dim light, sound isolation to eliminate external sounds that could be emitted and the walls should be painted in light blue color for a better-quality video picture, etc.

6. Conclusions

The e-learning network service can effectively contribute to improve opportunities for educational and professional rehabilitation of the population in less-favoured areas. Recent network developments can support the education and training of people in LFAs with interactive communication between the instructor and the trainees. In such a case, the instructors pass their specific knowledge or "know-how" to people in areas away from the productive centres of the country. A structured e-learning project that combines Web-based learning environments and tele-conferencing for training purposes can act as a tool for the motivation of the population to use local resources for commercial activities in order to increase their income, reduce unemployment and finally enhance local development.

The basic parameter in the procedure of LFA development should be the effective information of the local authorities and population about the contribution of improved network services in the development and design of hypertext environments implemented on the WEB, to support asynchronous e-learning activities and/or synchronous activities in local tele-centers, fully accessed by the majority of

the target population. Thematic units appropriate for such e-learning projects are local traditional activities, as in the case study of Soufli sericulture activities. Web-based training courses, combined with real-time online, tutorials can create new professional opportunities for population groups through proper local training in new improved methods and practices, the acquisition of new skills and their motivation for commercial activities.

In the case study area the enhancement of sericulture activities through e-learning activities should be based on seminars about mulberry plantations to improve the production and the quality of leaves, to enhance silkworm breeding techniques for the production of quality cocoons and to reduce the environmental impact and to provide the motivation for commercial activities in silk processing under proper management.

The experience from the exploitation of e-learning activities in other EU countries can be a model for such initiatives for local development in LFAs in our country. Also, new technologies and their penetration rate in our country represent a positive indicator of the existence of the necessary infrastructure to allow an ongoing process for e-learning projects.

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