Platform of Virtual Training for Work

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Abstract. The Colombian state function of training skilled workers is assigned to SENA (National Apprenticeship Service), which, in order to cope with the companies' needs related to qualified work, has been interested on using the current informatics network infrastructure. The existing pedagogical model as well as a pedagogical model applied to the virtual training will be described in this paper. Based on this, an infrastructure of technical resources is proposed to implement a National Virtual Training. The suggested solution implies making the existing national training Centers suitable for this kind of virtual program, using appropriate informatics network technologies to favor learning and skills development.

1 Introduction

A description of pedagogic model given in a technical training institution is made in this paper. Section two presents the current process for a person that wants to become an apprentice in a vocational occupation that is needed by the productive sector. In section three an appropriate solution is presented to cover the territory thoroughly, keeping in mind the telematic network, human and existent didactic resources and adding new technology to this, like virtual reality, instead of investing in a variety of real equipment and tools for qualifying. An instructional model for doing this, is exposed here. In section four the necessary tools to interconnect the whole territory are presented, having the current net and the new technologies.

2 Current Pedagogical Model

A person enters SENA in order to develop some skills which allow him/her to get a job. The future worker is guided by an expert team of instructors through a process that includes theoretical, technical and ethical background to enlarge their acting range (polivalency) [1], [2].

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The current SENA's infrastructure only covers 15% of the training needs at the whole Colombian territory, according to the national law [3]. The remaining 85% is covered by private institutions[1].

The apprentice, at the beginning, receives theoretical concepts and then receives a guided training in technological skills in a true workshop. This process is completed in the company that needs his/her working profile in a competitive environment [4].

3 The Proposed Pedagogical Model

The proposed pedagogical model includes: a curriculum that aims to some training goals of in agreement with the labor necessities; an appropriate virtual training teaching method, supported in physical infrastructure, appropriate to the whole national territory and modern equipment with hypermedial structuring [5] of the courses.

The logical sequence of virtual training is presented in the Fig. 1, where the center of the process is the apprentice who interacts with other apprentices to share information and to carry out consultations with the tutor, in a same way, he/she takes part in the modules of the content, as well as the virtual laboratories and the evaluation that is checked by the tutor for a later feedback. With the self-evaluation, the apprentice can verify his/her advance in the training [6].

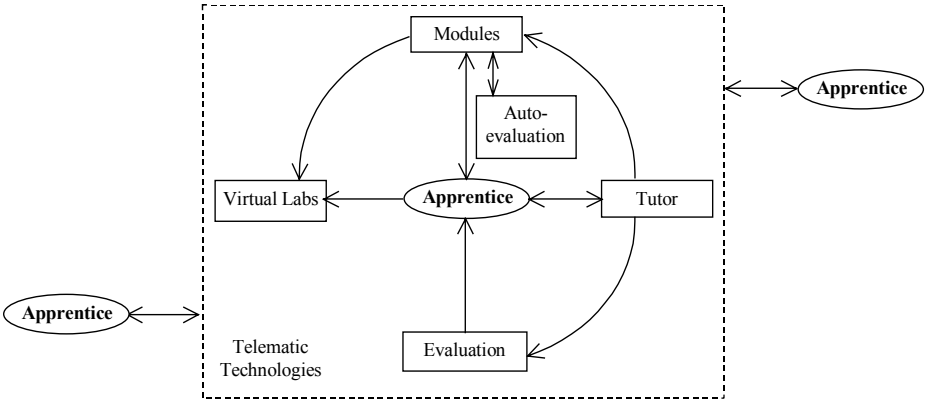

Fig. 1. Training process description and elements

The contents of a specialty using virtual training, have as a goal to accomplish the same skills and abilities like in the traditional formation [7].

The formation Centers will be located in the whole national territory endowed with telematic resources, in flexible schedules where the apprentice can choose the place and the time to receive his training. The virtual training at technical level should be carried out from Primary Centers (PCs) where conferences will be managed toward

[1] Obtained data from one of the Sectorial Tables that gather SENA with the companies.

Secondary Centers (SCs) located in different regions around the country; these SCs will have the necessary network infrastructure for the connection with the PCs.

The PCs would have tutors that will lead and evaluate the apprentice's progress, in order to observe the development of abilities and minimum skills a specific work in the labor field. A typical SENA's apprentice does not have resources for acceding Interenet, that is why he/she needs to go to a PC or SC.

The fact of training the apprentices in manual abilities, implies that they should manipulate current equipment in the industry, but due to the impossibility of endowing Centers with all type of equipment in the whole country and, in order to increase the coverage, it is necessary to apply technologies of virtual reality.

The peripherical technologies to use, consist on the group of necessary hardware for interaction; this equipment includes helmets of stereoscopic vision or *Head Mounted Displays (HMDs), scanners*, and *gloves.*

The software programming will be carried out based on Virtual Reality Modeling Language (VRML) [8], that allows the interaction of the virtual environments to be used in Internet or in a broadband public network of different characteristics.

4 The Proposed Technological Model

The virtual training will demand the presence of the apprentices in the SCs. From 110 Centers in operation, distributed in the whole Colombian territory, five are proposed as PCs and the other ones have been specified as SCs. Inside the proposed model the access to Internet and Internet2, appears as knowledge base, since the virtual formation for SENA will not be implemented over Internet, but it is possible that some programs can be diffused via Internet, if it is not required development of manual abilities or using in particular industrial equipment. Each training center will contain different kinds of rooms equipped with modern technology to enable interconnecting tutors and apprentices.

At the beginning the PCs physical part must implement category 6 cabling system according to the EIA/TIA standards [9], in order to implement Giga Bit Ethernet LANs, because the servers are inside them as well as tutors for the national network and apprentices receiving training as shown in Fig. 2a. In the SCs virtual reality equipment are found as well as LANs connected toward the broadband national network as described in Fig. 4b. The access to Internet is carried out by the PCs connected to Network Access Point (NAP).

The optical fiber ring interconnecting the cities where the centers are located, through the ATM network, allows the flexibility of increasing the bandwidths to the required values of 10 Mbps for the PCs and of 2 Mbps for the SCs. The last mile solutions for each one of the Centers will be implemented with Asymmetric DSL (ADSL) connections in the SCs and High Data bit Rate DSL (HDSL) connections for the PCs without direct access to the ATM ring. For the different connections toward Internet, the IP networks belonging to SENA will implement Multi Protocol Label Switching (MPLS) [10], as solution of a quick interconnection that allows the use of virtual circuits emulated on the IP networks increasing the routing speeds and so of convergence in the connections.

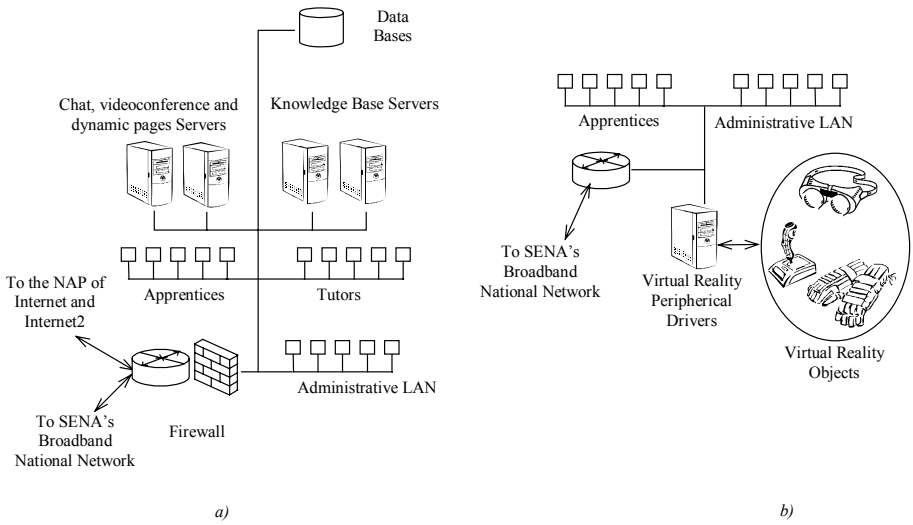

Fig. 2. *a)* Primary Centers (PCs) infrastructure *b)* Secundary Centers (SCs) infrastructure

IPv6 is going to be used with all the improvements that this network represents [11]. In Colombia the network access is done by four nodes. Internet2 will be implemented as knowledge base.

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