EFESTO PROJECT: A *DEAFINITE* STEP TOWARDS E.INCLUSION

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Abstract

Starting from the learning needs analysis of deaf students, often struggling with language acquisition and facing some difficulties in getting and processing information, and taking into account the actual trend of the European Commission that has recently published the "European Disability Strategy 2010-2020", this paper describes an innovative distance learning environment developed to help deaf learners (namely students and workers) acquire more skills related to the use of modern electrical apparatuses and to some scientific and digital subjects, such as Information Technology, Mathematics, and English. The authors, in particular, will describe the environment architecture and will draw special attention to the new didactic methodology that has been devised using distance learning technologies. This new methodology defines for each type of content selected a different structure and integrates different multimedia and didactic solutions to better convey the topics to the deaf.

Innovation, technology, distance learning, deaf

1 - Introduction

The "pathological" world view of deafness as an impairment has affected so many issues of concern to deaf people that a review of the subject appears as vital at this point. Considering the meaning of the word "handicap" (i.e.: a physical or mental disability placing a subject at a disadvantage), one can easily understand how inappropriate this expression is when referred to deafness. As a matter of a fact, deafness cannot be dismissed as a deficit tout court, as a naïve stereotyped clinical definition wants it to be. Although deaf subjects actually have a hearing loss (and in various *different* degrees), this does not imply that deaf people are unable to speak and, therefore, to learn a language. People with various degrees of hearing loss still maintain other potentialities intact; this is why most of them prefer being defined merely as "deaf" or "hard-of-hearing" rather than "hearing impaired", an expression which focuses on what is missing rather than emphasizing what is left. For a long time, instead, hearing limitations have unfairly been associated - by hearing people - with intellectual limitations; thus, an audiological loss was immediately equalled to a cognitive loss [12]. Moreover, deaf people have often been considered as "deviate" from the norm, that is, the hearing subject and, as such, they were supposed to need being "fixed". Unfortunately, even today the social image of deafness is marked, in too many countries, not only by a deeply pathological stigma, but also by negative stereotypes that have long prejudiced the inclusion of the deaf in many social areas, especially in the labor market.

The state-of-the-art of social inclusion and labour market in the European countries involved both in the project under discussion (Italy, Poland, Hungary and Bulgaria) and in the VET of deaf people [8-10] - which underlies the activities devised for the eFESTO project - shows some important points: in Italy, despite the innovative legislation for better access to labour market and also to the many initiatives made possible thanks to European projects, the disabled have still now a limited access to the labour market with the employment rate of people with disabilities being 19,3%, compared with 55,8% of non disabled people; in Poland the rights of the disabled are guaranteed by the Constitution, besides by other legislative acts; above 80% of the disabled Polish (here including deaf too) are excluded from the labour market; in Hungary the present governmental system promotes the social inclusion and employment of people with disabilities through a great number of measures; however, the latter relate to people with disabilities in general and do not provide special measures for young deaf people; in Bulgaria isolation is one of the biggest problems experienced by the disabled; experiencing many difficulties to access the surrounding environment, they are in fact prevented from fully and actively participating in social life.All of this can help explain the high unemployment rate of the disabled. The same state-of-the-art also clearly shows to what extent the education system in each involved European country is able to help deaf learners; the focus is mainly on primary and secondary education, higher education, VET systems and LLL systems. Italy has fully recognized the integration of the disabled in mainstream schools; the Polish Special Education System is integrated with the

General Education System; in Hungary deaf are educated separately from their hearing peers and in spoken Hungarian language; in Bulgaria the education system offers two types of approaches: the former is based on facilitation and rehabilitation from an early age and is practiced in specialized institutions; the latter is implemented in public schools where special individual programs are carried out after class.The reason for the lowly-qualified vocational activities of young disabled, in most European countries, is to be found in various factors, basically including a low-level education and inadequate vocational qualifications. Young disabled people at large do not benefit from an early orientation and are not properly guided to an appropriate vocational preparation; this is mainly due to the educational choices made by schools, which often focus on teaching jobs and skills that are either no longer required or marketable or that are simply inappropriate. Considering this background information, it is fundamental to give disabled people an opportunity to access the education services necessary to acquire new marketable skills, including a communicative competence in foreign languages, that has become so necessary in the labour market, thus overcoming the problem of social inclusion. Another serious problem to consider is the difficulty faced by the deaf in understanding scientific topics, owing to their poor vocabulary that often does not include specific scientific terms.

e-learning or distance learning can help achieve this goal: indeed, it is modifying radically the way by which individuals can enrich their competences; furthermore, it is eliminating the historical barriers that have prevented many people from having access to education and training formation. For these reasons, learning “digital” subjects (as Mathematics and Information Technology), foreign languages - especially English - and how to use and manage modern laboratory apparatuses is fundamental to provide disabled citizens and, in particular, the deaf, with learning opportunities suitable to the modern vocational needs, so as to acquire more “marketable” skills. These are the main objectives of the eFESTO [1] project, funded by the “Lifelong Learning Programme - Leonardo Da Vinci - Transfer of Innovation” [2]: to devise an innovative learning environment for deaf learners useful to acquire more skills in managing and using electrical and electronic equipment in different application fields, such as biomedical, telecommunications, industrial and sustainable environment areas. The system will also deliver specific English courses for deaf learners, a very important competence to get in the labour market. In this way a more “sustainable” learning environment will be created, favouring the inclusion of the deaf and respecting their right to a high professional education.

2 - Transferring experiences: outcomes

The eFESTO project derives from the experience of two previous projects lead by the University of Sannio and funded by the Italian Ministry of Education through the PON (Programma Operativo Nazionale) 2000-2006: the LA.DI.RE. “G. Savastano” and the PSELDA projects.

The LA.DI.RE. “G. Savastano” *project*

An extensive practical training is essential to ensure a good knowledge transfer from teacher to students and, therefore, to train good professionals. Indeed, in order to understand the measurement procedures and measurement system design, it is necessary to repeat the same measurement experience of real physical phenomena over and over again, in order to make all learners able to operate the measuring instrumentation. However, electric and electronic measurement laboratories, both public and private, are not widespread, due mainly to their high cost, and this makes lifelong learning difficult to implement for specialized technicians, especially in the field of process and quality control, and test engineering. The LA.DI.RE (Laboratorio Didattico Remoto Distribuito su Rete geografica) “G. Savastano” Virtual Laboratory is an innovative distance education system for experimental activities [8], aimed at teaching electric and electronic measurement subjects. This environment simplifies the most relevant steps in the learning process, especially in scientific and technological fields [2-5], and uses a commercial LMS providing a set of didactical and administrative tools. Most of the LMS allow to track the user’s progress and performance across all types of training activities; moreover, the use of the standard LMS ensures the interoperability and portability of LOs. A further innovative aspect is the distributed architecture involving different physical laboratories geographically distributed at national and international levels [9-10]. Moreover, LA.DI.RE. boosts the feeling of working on real instruments and in real conditions using some technological solutions based on ip-camera to visualize the evolution of the experiments in real time [11-12]. This is the first proposal to avoid specific client-side applications and to use the thin-client approach to transfer the processing of the software to the server [6-7].

PSELDA project

The teaching methodology adopted by the PSELDA (Progetto Sperimentale di eLearning per Disabili Audiolesi) project was agreed on thanks to the suggestions given by experts in teaching the deaf. With the PSELDA system, the learning process takes place thanks to a series of related didactical steps basically consisting either in lectures or in activities. The topic of a lecture is presented to the user step by step, through descriptions that closely relate to the images illustrating the functions to be carried out. As lectures need to have a high "visual impact" to be easily understood and memorized by the deaf, they strongly exploit various multimedia objects (text, images, videos, animations, etc.). The interactivity offered by PSELDA for multimedia lectures is aimed at illustrating, in an easy and immediate way, the various steps to be followed in order to get the explanation of a specific topic. Activities are also presented to students in a highly interactive way; they can be mandatory or optional and give the student a score which can be useful for the evaluation phase by the teacher. An activity is made up of three main parts: i) introduction, ii) answer, iii) video translation in Sign Language. A help function adds to these parts. The answer can be given by means of several options: multiple choice, drag and drop, or by typing it into appropriate spaces. The "help" function gives some useful suggestions to solve the activity. Such suggestions can be organized into one or more steps, typically starting from simple theoretical recalls towards more and more practical steps. The user can autonomously work on the proposed activity and try to give the correct answer. If s/he has any doubts about the correct answer or has any difficulties in solving the activity, s/he can use the help function. According to the answer given and to the procedure followed to get to it, the user obtains a specific score: a positive one (which depends on the complexity of the activity) for an immediate correct answer, a minor score for a correct answer given by using the "help" function, and finally a score equal to zero for a wrong answer. The user receives feedback to the answers given through a high visual impact; the project experimented the use of emoticons (happy and sad expressions), which give the student an immediate "visual" feedback.

3 – The new methodology in the eFESTO project

Exploring and devising new teaching methods, through the mediation and support of technology, can help make the exchange of information and communication easier for deaf students while they are studying, which seems to be one of the basic conditions for them to enjoy a higher education as their hearing peers. When teaching deaf and/or hard-of-hearing students it is important to try and use methods capable to include them and help them get the most from lectures and seminars. Although the learning process in a deaf student basically does not differ from a hearing learner's, it is still useful to keep in mind some points when teaching the deaf [11]: they heavily depend on visual aids, since they structure and organize their thought through images rather than through words. So the teacher should use "visual" clues for learning (e.g. pictures, posters, videos) and often resort to writing as a way of communication; the teacher should never talk to students turning them her/his back while writing on the board. Indeed, it is helpful to address students only if you are in front of them, so as to favour lipreading; a deaf student cannot make notes and lipread at the same time; students should be given basic information and book lists before the beginning of a course, as they may rely more heavily on handouts and textbooks than on lectures; the lecture should be carefully and logically structured - allowing for a frequent variation of activities - and include regular opportunities to review the material; it is necessary to point out who is speaking in group discussions: deaf and hard-of-hearing students get lost in classroom discussions when several students are talking at the same time. Environmental noises as well can prevent them from understanding; if a sign language interpreter is employed, there will be no eye-contact between the teacher and deaf students, as the latter will look at the interpreter and answer either through him/her or by themselves. Considering all this, it is worth reflecting on how ICT can be used to enhance the potentialities of deaf students by devising specific e-learning environments capable of helping them bridge the communication gap they are often forced to struggle with and that can prevent them from fully participate in the world they live in. In particular, the relevance of technology lies in its ability to help improve communication; help reduce dependence on others; translate spoken words into visual cues.

4 – eFESTO

The new on-going project illustrated in this paper has been devised bearing all this in mind, and, as said before, thanks to the experience from two previous projects. In particular, eFESTO allows deaf users to "visually" learn subject-matters related to electrical and electronic equipment - presented both in written and sign national languages - while, at the same time: benefiting from a continuous on-line formation (lectures and activities are available at any time and whenever the user needs them); enjoying courses specifically thought for them; receiving an effective help in their learning process, thanks to the help of multimedia technology; personalizing their education through a one-to-one learning; benefiting from didactic models of distant learning based on the

creation of virtual classes, where teachers and students can interact throughout the learning process, even if far away; monitoring the quality and quantity of their learning (tracking the time spent on lectures, activities and obtained results, etc.).In particular, the methodological approach underlying the making of the eFESTO teaching contents takes into account at least three basic elements in the education of the deaf: deaf people are the end users of this project; therefore, the first criterion used considers the difficulties met by the deaf in their acquisition process of correct language competences; the peculiarity of a proposal that aims at using suitable technological solutions to devise efficient e-learning activities inevitably contains a methodological choice strongly affecting both the process architecture and the shape of the products that will be planned; the peculiarity of each type of subject content to be devised necessarily leads to the choice of a specific methodology in compliance with the structure of the subjects chosen. These elements have played the role of guidelines not only in shaping the methodology adopted by eFESTO, but also in defining the communicative choices underlying the presentation and organization of both the contents selected and the various stages in the platform development. As said before, the focus will be on three subjects: English; scientific subjects (Maths and Information Technology); the use of lab advanced electronic equipment. The contents devised for each of these subjects will be written in national language and accompanied by a video translation in both national and international sign languages; the latter is optional as the user can decide to watch it or not. For each subject a set of reinforcement activities will also be offered as a support to the comprehension of the topics explained. The national sign language translation will be synchronized with the written text, that will be highlighted by changing its colour as the video is being played. Synchronization is made on the basis of single sentences because of the well-known structural, lexical and grammar differences between sign and vocal languages. Users will also benefit from a glossary of scientific terms, aiming at giving the deaf an explanation, in both spoken and signed national languages, of the terms most frequently used in the lectures. Regarding lab activities, the main subject content consists of three different and sequential stages: i) the text of the subject content supporting the lab exercises and translated in English to favour the sharing of information; ii) the video-tutorial recorded by the teacher in the lab (accompanied by synchronized subtitles), illustrating the use of the equipment and the experiment modalities; iii) the experiments themselves to be conducted remotely.

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