An e-Learning Management System for the Deaf people

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Abstract: - This paper presents a learning management system (LMS) which offers Greek Sign Language videos in correspondence to every text in the learning environment. The system is designed notably for deaf adults for the purpose of their lifelong vocational and educational training. In the LMS, the special needs of deaf learners are satisfied, as e.g. bilingual information (text and sign language), high level of visualization, interactive and explorative learning, and the possibility of learning in peer groups via video conferencing. In this environment, for the first time, Greek signers are able to learn in their own language, the sign language.

Key-Words: - e-learning, deaf people, sign language, videoconference.

1. Introduction

The reading/writing and mathematical skills exhibited by deaf people are well below that of hearing people, although their mental capabilities are basically the same. The main reason for the huge discrepancy between the skills of hearing and deaf people is due to the socialization of the deaf. In Greece, most deaf children have hearing parents who have little or no command of the Greek Sign Language (GSL). For most deaf people their first contact with GSL is in school during break with their deaf peers. This fact plus the inaccessibility of information through radio and television (due to the lack of subtitles) turn into a vicious cycle which is difficult to break. Without a fully developed first language – spoken language cannot be acquired due to deafness and GSL cannot be acquired due to the lack of exposition – learning how to read and write becomes an almost impossible task to master. Therefore the reading level of young deaf adults is comparatively low, namely at the level of hearing fourth graders. This makes book learning nearly impossible.

Even though there have been enormous developments in the area of multimedia use, such as the internet, CD-ROMs, video conferencing, e-mail, etc., this does not guarantee a satisfactory work life. A satisfactory work life includes a considerable increase in self-esteem and an immediate contribution to life quality. At the same time, a fulfilled work life is neither something that can be taken for granted. Many deaf people are unemployed. Two main reasons can be identified for these special socialization conditions: One, an inadequate estimate of the performance abilities of the deaf, and, secondly, the communicative problems between deaf and hearing colleagues.

Specifically, in the sectors of e-learning, an important blossoming in the work market is observed and new places of work in the enterprising sector are continuously created. Consequently, the target group (Deaf people) that faces problems of social exclusion and unemployment, have multiple profits from the action of distance and long life training.

GSL [1] is a natural visual language used by the members of the Greek Deaf Community with several thousands of native or non-native signers. Research on the grammar of GSL per se is limited; some work has been done on individual aspects of its syntax negation [2], morphology [3], as well as on applied and educational linguistics including comparison with spoken language [6]. It is assumed that GSL as we now know it is a combination of the older type of Greek sign language dialects with French sign language influence [4, 5, 7].

The internet has proven to be a boon for people with disabilities. But just as it is important to design buildings with accessibility in mind, the same is true for the internet. Flexibility is the key to accessibility. In a recent work, namely, ''Sign Language Europe'' [9] a software environment (ITOM) was developed that makes School-TV broadcast (or other movies) accessible [8] in two languages: Dutch by sound and subtitles and Dutch Sign Language. At the moment they use the ITOM with school-TV broadcast from Dutch school-TV broadcaster Teleac, but ITOM can be used for every video program available. Moreover, various Sign

language dictionaries have been developed recently [10,11,12,13] as well as e-learning environments [17,18].
In addressing the above context, the LMS is adapted to the specific learning problems of the target group, i.e. deaf adolescents and young adults. The provided content is bilingual. Bilingual experiments (spoken and signed language) in schools of the deaf and hearing impaired have shown that the use of sign language in the classroom furthers reading competence significantly. The basic objective of the present e-learning environment is the support of the equal rights of Deaf people for their access and real attendance in the vocational and educational training.

2. Presentation of the e-learning system

In the present section, we describe the following:
1. An e-Learning environment for the Deaf People adapted to them via the Sign Language. The environment is based on the usage of the advanced teleconference services of Internet (network virtual classroom) and offers a sum of facilities and services that is able to support, via an easy and friendly way, education and training in the form of life long and continuing education for the Deaf People.
2. The electronic "adaptive" content for Deaf People. This content is based on animation (flash technology) and streaming video (multimedia) and is directed towards the aim of training in e-commerce and new technologies of Internet. The material has been translated in the Greek Sign Language via Streaming Digital Video technologies.

2.1 Description of the system

In detail the system provides the following features:

- GSL is used as the language for explanations. The use of GSL in the software, however, is not confined to a mere translation of the Greek texts but the GSL videos are adapted by deaf researchers to the needs of the deaf user, the modalities of GSL, and the Deaf culture. This aims at improving the mediation of the content and serves as a strategy to enhance the learners' motivation.
- Wherever possible, the content is clarified by special forms of visualizing structures and processes. This is very important with a group of learners who are strongly visually oriented due to the mediality of their language, i.e. sign language.
- Videoconference and chat rooms enable learning in peer groups and help building a learning community.

Working with this LMS, deaf students will have the possibility to learn in a self directed way. Using the sign language videos they can concentrate on the content rather than getting lost while trying to understand written texts. And they do not need a teacher or interpreter for learning – they can learn independently. Furthermore, by using the medium internet many more deaf adults can be reached than with conventional teaching methods.
We must point out that the innovation of the e-learning system lies in the fact that for first time it was attempted an effort of distance courses, continues and life long training for the people with hearing problems. Moreover, the "special material" was development with the help of special educators dealing with the individuals with hearing problems.
The total work was separated in the following sub systems, namely: 1) Production of educational material of distance training in the Sign language, 2) Telecommunications and Network creation, 3) Network electronic e-learning environment (Network Virtual Classroom) that support the tele-education – tele-training for the "special" team with aim in the Sign Language of each country – institution.

2.2. User Levels

Three user levels are distinguished in the environment. In each of them different supporting tools exist. Depending on the corresponding use, these levels have also a different role: administrator, instructor and student. Each of them interacts with the other through the ''informative'' and ''communication'' tools related to each level. A simple flowchart of the system is depicted in figure 1.

2.2.1 Administrator

The administrator coordinates and manages the e-learning application via the administration tools. The administrator determines which user level-group has the permission to use the corresponding ''informative'' and ''communication'' tools. Moreover, the administrator can communicate with the instructor in order to be kept informed about the progress of the instructors' courses.

2.2.2 Instructor

In this level, the instructor determines the educational and consulting material. The instructor also determines the development and the way that

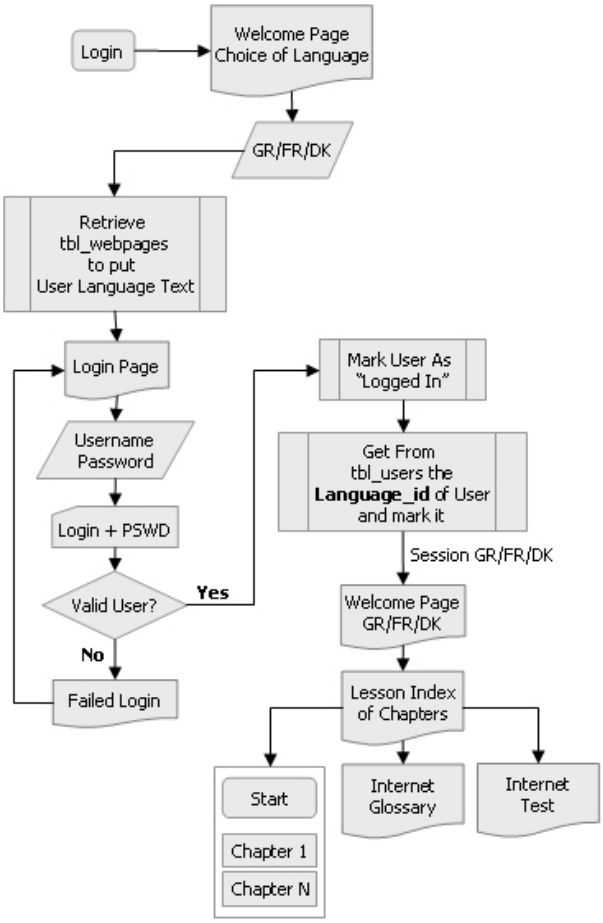

Figure 1 – Flowchart

the material will be presented to the students and in the entire internet community. He/she is able of producing the e-content for his/her course, aiming at the better comprehension and assimilation of his course from the students or the unauthorized visitors. Finally, in this level, the communication between the instructor and the students aims at the resolution of questions at the development of courses.

2.2.3 Student

The student determines the successful development of seminar and courses. Moreover, the student reads the educational material registered by the instructor, communicates and poses questions to the instructor. He/she is the one that tries to resolves exercises or questions of multiple choices. It must be remarked that the student has access in all the information and services independently of the related to him courses' implementation. In this way, continuous access in the knowledge is achieved and consequently the better course comprehension.

2.3. Principles and e-learning procedures

The analysis of needs and the description of services that is provided are impressed in three phases of educational process [14]:

Preparation of visual class. (Asynchronous phase), Activities: Planning and parameterizations of interactive environment of courses via the internet with the use of special program of Reader of Web pages (Web Browser). The complete material of courses of distance education is stored in a local or removed (network) base from where the user might draw the information according to planning of environment of the distance education. Also the possibility of communicating with experts and announcing the course and the availability of material was given to the instructor. In the educated persons it gives the possibility of studying in first phase the under representation material and of submitting the first questions.

Operation of visual order (Modern phase), Activities: At the duration of course the professor via the system of videoconference, multipoint [16] video/audio, via text chat, shared whiteboards, web based pre-, post -, in class interactive program of interpellations, presents the material and the educated participate actively and can collaborate at teams. Also the system via network refers the educated in additional material. Also all the process is recorded for future report by the instructor but also by educated.

Operation of review (Asynchronous phase / Post - class), Activities: The review of class concerns the part of activity as the modern phase of visual class is completed. Naturally it can have a lot of phases at units and courses. The material that has been already presented in the visual order is accessible. There were questions of understanding the course, multiple test, so as to be a complete picture of progress of understanding the course from the educated.

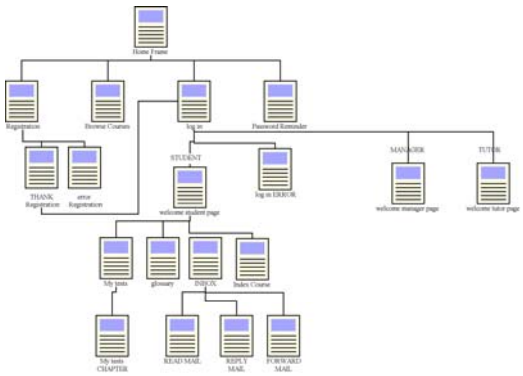

Figure 2 – The system's flowchart

Self - education (Asynchronous phase), Preparation of the Self-education: The self- education [15] is totally found in asynchronous phase. The educated

have access (search and recuperation) in training and informative material, connected with the base of material, for various cognitive and more general subjects that interest him. Thus we use all the possibilities of visual class that are used in asynchronous phase. We have access (search and recuperation) in training and informative material for various cognitive and more general subjects that interest teachers. In figure 2, we present the flowchart of the e-learning model and in the figure 3 we present a view of the platform design.

Figure 3 – A view of the platform

3. Adaptation of the LMS for the Deaf people

The environment of the e-learning system uses asynchronous services of delivery of the educational material and modern and asynchronous services of communication and collaboration, trying to exceed the exclusions that are related with the time and the place of training but also to satisfy the needs of deaf students with variety of possibilities of equipment and communication.

The model of visual classroom has been applied with use of services of videoconference via picture, at the same time with the possibility of realisation of cooperative activities of real time (whiteboard, application sharing, file sharing).

Apart from the model of visual classroom, the model of Supported Self learning, there is in use also. A basic rule that should condition the systems of tele-education for self learning, is the control. This means that the educated person is simultaneously able to use the course but also to intervene in the flow and his structure. In this model the strategy is learner centred.

The services that are provided by the environment are categorized in four fundamental axes:

- Visual order: line of courses in real time with possibility of interaction via internet.
- Self-instruction: access (search and recuperation) in training and informative material for various cognitive and more general subjects that interest teachers.
- Cooperative learning: communication and attendance in thematic circles of discussions and development of cooperative activities.

The students can retrieve a Greek Sign Language video (GSL-video) for each text block by clicking on the icon in front of the text block. The GSL-videos are not shown immediately because the learners should first try to read the written text. If they have difficulties with that, they can then see the sign language video. The GSL videos will be offered in three video qualities: ISDN, DSL, and LAN. So users will get the video quality that suits their internet connection. For playing the videos the users only need a current QuickTime plug-in for their browser.

An integrated communication component consisting of chat and video conference enables the deaf students to communicate directly while working on a course. The video conference has three slots in each video conference room. The chat is free for users who do not get a slot in the video conference. The communication component runs in a separate browser window. All the users need is a web cam and a Flash plug-in for their web browser.

The use of templates for pages, exercises, and test makes the creation of learning content much easier and guarantees a homogeneous and clearly arranged design. The author chooses a page layout or test type and fills in the content.

Additionally, the author has the possibility to choose different content block templates to design a page. There are templates for headlines and for content with a specific meaning, e.g. summary, task, definition, solution etc. The content block templates have different layouts for the specific content and a special icon placed in front of the content for easy recognition. This way the learner is immediately aware of the function of the content block. This content block mechanism improves the readability of the text.

5. Conclusion

As described in this paper, the use of sign language furthers the reading competence of deaf people and enhances their acceptance and understanding of learning content presented to them. Based on these findings, a learning management system is adapted

to the needs of deaf people with sign language videos for each text block as the most important feature. Providing sign language videos will help the users improve their reading skills and enable them to learn more independently. Adapting a learning management system was given the preference in comparison to proprietary solutions, because using a learning management system facilitates content creation and content adaption and the learners get a wide range of standardized user interaction possibilities.

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