Deaf People Education: crossing linguistic borders through e-learning

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Abstract

The introduction of Web Technologies and the development and spread of portable devices has improved the quality of life of deaf people making distant communication easier. In particular, the development of online systems including video-messaging and the possibility to upload user generated contents, has given deaf people the possibility to rely on other, more direct, means of communication. Similarly, the development of e-learning platforms and their adoption in most Universities worldwide, is shaping the way education is conceived, leading to new and innovative systems merging in-class education with e-learning systems. Our contribution gives a first explanation of how Information and Communication Technology (ICT) can be a strategic resource to give deaf people equal educational opportunities focusing on the development of appropriate language skills, and the strategies through which these opportunities can become effective. Our experience is based on the results and outcomes of DEAL Project (Deaf people in Europe Acquiring Languages through E-Learning), carried out from Istituto Statale per Sordi Roma (ISSR - State Institute for the Deaf in Rome) with co-financing from the European Commission. The objective being that of creating an e-learning model for teaching foreign languages to deaf individuals in professional education, and giving new bases to researches in the field.

1. Linguistic competences in Deaf People: an integration problem

Deaf people officially certified in our country (Italy) are about 60,000, but it is estimated that this number does not reflect the true dimension of the problem. About 11 of every 10,000 children born deaf.

Deafness is a deficit, but not a cognitive one. However, School still offers no effective systematic response to the problem of deaf education. The social cost of this situation are enormous: not only deaf people are often excluded from written communication, as well as from the spoken one; in many cases, they cannot perform professional tasks involving minimum competences in written language and cannot access higher levels of education.

Researches done in this field (Caselli et al., 2007; Fabbretti et al., 2006), reveal that deaf people, especially those whose deafness aroused in pre-linguistic age (before 18-30 months), have typical problems in the acquisition of written language and in the development of linguistic skills. These problems are specific for each culture and each language, and they are not always comparable. In Italian, for example, deaf people show lacks in the use of free morphology, clitic pronouns, prepositions, articles and so on. This means they need tools and educational methods aimed at resolving them. This is often a difficult task, due to the differences in deaf people logopedic rehabilitation and educational paths, and, thus, their different writing skills. Any possible solution has to adapt both to the type (genetic, sickness, etc.) and degree of deafness (deep, medium, light, partial), as well as the learners' specific linguistic and communicational competences and abilities.

In this perspective, the evolution of web technologies towards portability and adaptability to users' needs, and the use of educational strategies based on e-learning tools can forecast an enhancement of the effectiveness of the actions directed to this specific target.

On the user point of view, the new forms of digital communication constitute a horizon of authentic interactions in the national written language (or rather, written/spoken) in which deaf people immerge themselves spontaneously and with strong motivation. This means that, inevitably, through these interactions they acquire language skills.

In short, the use of new technologies in deaf people education configures for the first time a domain in which deaf people with medium/low skills in the written language can improve themselves through the involvement in real communication phenomena and not only through learning contexts. They can thus acquire languages, not only learn them.

2. Sign Language as a possible tool for promoting deaf people linguistic competences

The condition, however, is that strategies and tools are to be really oriented on the needs and resources of deaf learners. This is the crucial point of the researches and experimentations achieved so far, and can be divided into a number of critical issues that will be considered in the development of our contribution. Most of the findings here described are based on the experience gained working on the DEAL Project (Deaf people in Europe Acquiring Languages through E-Learning)[1].

In the case of deaf people using sign language[2], the role of it in the didactic communication with and within the students is particularly important as part of promoting the development of skills in the target language. In fact, deaf students using sign language find it particularly comfortable as a language to refer to, putting them in the correct emotional condition to become a learner.

Within the process of building these skills, we have

[1] Please refer to the acknowledgement chapter for further information on the project.

[2] All researches and developments of the project here depicted has considered the micro-culture of deaf people using sign language, to which we will refer, from now on, as "deaf people" or simply "the deaf".

considered sign language as the perfect candidate to be one of the cornerstone resources in the design of all activities concerning the didactic communication: research, problem setting and problem solving, meta-linguistic reflection, metacognitive analysis.
Building the e-learning platform, we have chosen to use sign language in both the interactions among peers and with teachers, integrating the online educational path with videos and explanations in sign language, and the possibility for the students to obtain further information through the video-chat system.
The effective implementation of this strategy has brought up the importance of creating tools specially designed not only to allow sign language interactions regulated according to their purposes, but also to support building of feedback structured on a mosaic of codes. This means not only stimulating the use of sign language, but also creating a feedback system among teachers and learners, as well as between the learners themselves, allowing didactic activities to be really effective. Following what learners are doing, teacher will have the opportunity to intervene with different feedback degrees, tailored on the learners needs.

3. Deaf People in Europe Acquiring Language through e-learning: the construction of a specific educational path

The actions forecasted in the DEAL project were meant to significantly operate in this framework, through the introduction of educational tools based on an e-learning strategy, targeting the needs and the specific capacities of deaf adults.
In DEAL e-learning based approach, we enhanced the methodological strategies and educational techniques that allowed the action upon those critical features in lexical and grammatical production indicated by the researches carried out in the field: we worked both on a lexicon level and on the linguistic structures for the development of the language skills of deaf learners through the integration of Sign Language in an educational perspective.
The system is based on the use of an open source e-learning platform (Moodle) and a videoconferencing system based on Openmeetings/Red5. The choice of Moodle has followed that of many European Universities, adopting this platform for their online courses. Opportune adaptations were studied and applied to meet the needs of the target group (teenager students of technical schools for enterprise secretaries).
The applications that have been added are:

- Explanation and introductive videos in the local sign language
- Animated segments with subtitles upon which educational activities has been developed.
- Interactive teaching activities where the tutors can work with the students starting from their questions and their doubts in the educational system. Explanations are thus given from the active interaction with the students and not “from above”.
- Videoconference possibility
- Forum

While following the teaching activities, at various set points along the course, deaf students uses special supports in their own sign languages. There are two kind of support:
One way:

- Presentation of the teaching unit
- Lexical micro windows on the dialogue
- Grammatical, syntactic and pragmatic support on the key concepts of the unit
- Full translation of the dialogue

Bidirectional:

- Videoconference among peers
- Videoconference with the teaching team

The project has produced three courses: German, Italian and Spanish as second languages for the deaf students of the partner countries. For example: Italian deaf students had a Spanish and a German course available. This means that each course has two sign language to support it: for example, the Italian course has both supporting windows in Catalan Sign Language and in Austrian Sign Language.

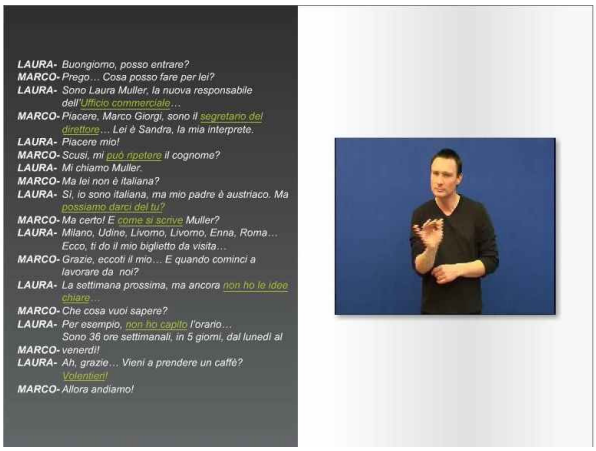

Figure1: example of an Italian comprehension exercise with micro-window explanation in Austrian Sign Language.

An interesting issue in working in such a multilingual environment has been, on several point of view, the lack of human resources having the skills and capacities required from the project: i.e. a tutor capable to sign in Catalan Sign Language to give information about German or Italian language course. This could be an issue to discuss in an international environment, also for the construction of possible professional figures.

4. Evaluating the DEAL platform, issues and future develoomens

The DEAL project has begun in September 2006 and the main prototype test has been carried out in May 2008 in Italy for the Spanish course. The experimentation took place in the Istituto Statale Superiore Magarotto (ISISS - State High School “Magarotto”). Eight deaf teenagers has

participated, all students of a high school for commercial secretaries, of which six have accepted to reply to the final interview. They were all familiar with computers and have never studied Spanish.

The platform has been tested in a blended modality, having a technical support in the classroom as well as a teacher they could ask questions to. The experimentation has also tested both the asynchronous and synchronous interaction modality. During the test, while following the course indications, the students could share their questions both in a Forum (asynchronous modality) or a Videoconference environment (synchronous modality) where the teacher would reply to questions through the help of an interpreter.

The materials used to collect the information coming from the experiments has been: anamnesic questionnaires for teachers, observation checklist filled by the researchers, and a final interview to participant students.

Anamnesic questionnaires for teachers has collected personal data of the participants, information concerning the type of deafness, her familiar situation, and her linguistic competences in Italian and foreign languages, if any, both in vocal or sign language modality.

Observation checklist were filled by 2 researchers per participant, in three sessions of 20 minutes each situated in the beginning, in the middle and in the end of the experimentation. The information collected in this phase being the interaction of the students in the classroom and with the teacher, the chosen linguistic form, and other free observations.

At the end of the test, participants were asked to express their opinion upon the degree and type of knowledge achieved during the course, a comparison with traditional in-class courses, feelings about the interaction with the system as a whole and possible suggestions on how to improve it.

The results have confirmed the validity of the chosen educational methodology, as the participants have confirmed learning something new about Spanish in a more stimulating and fascinating way. Participants liked using the videoconference system as well as the sign language explanatory windows, which has been considered a funny and clear way to achieve knowledge. However, the overall data collected in this phase has revealed the need to improve the overall navigation in the system, making the whole online experience more "friendly".

We believe that a solid evaluation of the platform will come with its use within the deaf community to which the system has been made available on the project website. However, the experimentation has given important information not only for that concerning the methodology to use on an e-learning platform, but also for that concerning the management of language codes and system interfacing.

Not only the educational path needs to be adapted to the e-learning model, but also the quantity and quality of information to give in each step must be managed according to the user's special needs and visual skills, as sight is the only sense in which all the information are conveyed during the interaction with the platform.

5. The management of time and space on an e-learning platform for the deaf: the importance of data transmission efficiency

Developing an e-learning platform for the deaf also requires a special attention to the management of time and screen space (Keatin & Miru, 2003).

This has emerged clearly during the experimentation phase of the DEAL project when, for example, giving signed explanations of words or grammatical segments. In cases like the one described here, giving students enough time to pass from the sentence under analysis (written text) to the video/chat is fundamental for both educational and motivational reasons. Teacher, computer screen, (eventual) interpreter, and other students play the role of "educational objects" taking their turn in the construction of sense for the student on both a spatial and linear line. On the spatial line, all "educational objects" must be positioned in order to allow students to return to the selected resource when needed, well localized in space and not undergoing changes. The linear line will be that of "taking turn" in the dialogical relationship among the "educational objects", and the amount of information given.

In a multilingual educational environment, in blended learning, where in-class sessions are completed by sessions with online tutors, this becomes particularly important. The role of the tutor is that of providing further adaptability to the course contents, cut upon the single learners' specific needs. To have the tutor online while developing educational tasks means that every single learner will have the possibility to ask questions about the course content, in a dialogical relationship with the tutor and the other students. Similarly, this feature allows the tutor to monitor the class development in relation to the course contents and to manage the students' community discussion in order to enhance learning in particular fields.

A possible scenario for this case is that of the student being home while the tutor follows her and other students in a separate ambient. Students are given the possibility to follow tutor explanation both on video or written chat.

Deaf students are continuously engaged in following and decoding messages through the only sense of sight. In a context like the one described above, their cognitive resources are thus engaged in processing at least three different codes: text, sign language video and teacher's explanation.

This means that, in the hypothesis of a teacher who is also a sign language speaker, s/he will have to give students enough time to allow sight to complete the video message decoding, eventually integrated with hints given through the written or video chat, think and then reply either in sign language or on written chat, in a distant construction of sense. The depicted situation is furthermore complicated in case of teachers who are non-signers, and the interpreter figure needs to be added.

An incorrect management of these types of interaction could lead to frustration, demotivation and possible abandon of the learning session. This is also the case when working on deaf people writing skills enhancement in the learners' local language (i.e. Italian deaf learner – Italian written language): it is proven that deaf people approach to written language is often affected by the difficulties faced during their linguistic rehabilitation and scholastic path, and the frustration they experience in constructing their writing skills (Fabbretti et al. 2006).

A proper management of screen space and time will impact the emerging relationship between students and teachers and the construction of the learning environment. In fact, while in the case of hearing students speech and sight works contemporarily in the construction of sense and on two different levels (student can watch the screen contents while listening to the teacher's explanation), in the case of deaf students there is only one level to work on, sight, which is engaged in receiving multiple inputs contemporarily. Visual elements in the screen should be managed in order to be highly visible, easy to decode, and giving good navigational cues also for the enhancement of the ongoing interactions in the system.

This great use of video and visual communication tools, makes data transmission quality one of the main issues of e-learning platforms for the deaf. Real-time online video communication such as video-chat for sign language or lip movement are strongly affected by the efficiency of data transmission, as this should be as close as possible to real people movements. Many are, in fact, the cases in which multiple video chats makes communication between deaf people (either bimodal or oralists) nearly impossible, due to the scarce quality of video transmission. This constitutes a strong limit in the development of online educational solutions for deaf people.

As it's possible to understand, a lack of efficiency in video transmission, a poor website visual objects management and a incorrect management of time could end up to a loss in deaf students comprehension of the main topics and their motivation in following the course.

6. Conclusions

Being one of the first experiences in Europe trying to teach a foreign language to deaf students through the support of e-learning, DEAL project has focused mainly on the structure of the didactic content, and the use of sign language and short "explanation" windows in a complementary and innovative way, in order to support several type of deaf learners needs. This has challenged other aspects of the educational path, such as the selection of the best technology to use, the design of a correct interface for deaf learners, the combination of multiple communicational channels and the "rhythm" of the ongoing interactions in the system.

One of the points that the DEAL project has aroused is the importance of creating a collaborative network among students and tutors, through the use of an effective and reliable technological support.

In this framework, thus, we need to search the best structure for educational communication with deaf learners and the role given to sign language in the variety of possible codes. This point is strictly related to the interaction regulation (learner/learner, learner/teacher, etc.) and time balancing (synchronous, asynchronous) to grant the maximum efficiency in the learning environment.

One of the results of our researches has been that the educational interaction in video conferences requires a definite number of participant. Basing on the DEAL experience, our hyphotesis is that an optimal number for a smooth interaction could be that of 4 people: i.e. one tutor and 3 students.

However, the problem of a system like this is the regulation of speech turn and the different communicational channels balancing: i.e. video-chat vs. textual chat vs. working area where the student is involved in her educational activity. There is a problem in optimizing sign language as a mean of educational communication in an environment in which the target language remains written and, in multilingual environment, is a foreign language.

The problems we have developed so far are surely strategic with regards to the target group, but they also have a relevance that seems to go beyond this specific scenario. In a "regular" educational environment, there are issues that are normally underrated due to the redundancy of communicational possibilities between hearing people who are able to pick up the information they need from the ongoing communicational process. Working on a multilingual platform for deaf people education has thus opened reflection not only on the specific problems that this type of user could meet but have also given a base for reflection on the nature of educational communication in foreign language learning.

In fact, these problems shows that the educational communication in e-learning environments shows inefficiency margins, amplified but not generated by deafness. Working towards the solution of these issues can thus have important theoretical implications also in the frame of second language education in digital learning environments.

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